



## MS AKT Practice Paper 3

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. An 88 year old woman has recurrent falls. She says that she cannot feel where her feet are.

There is reduced pinprick sensation up to the level of her mid calf and joint position sense is impaired in the feet. Knee reflexes are brisk, but ankle reflexes are absent.

Investigations:

Haemoglobin	91 g/L	(115–150)
White cell count	$3.5 \times 10^9/\text{L}$	(3.8–10.0)
Platelets	$130 \times 10^9/\text{L}$	(150–400)
MCV	116 fL	(80–96)

What is the most likely deficiency?

- A. Folate
- B. Iron
- C. Pyridoxine
- D. Thiamine
- E. Vitamin B12

**Correct answer: E) Vitamin B12**

**Justification: This is a typical presentation of B12 deficiency. The most common neurologic findings are symmetric paraesthesias or numbness and gait problems. This is much less common with folate deficiency.**



2. A 55 year old man has had lower back pain and fatigue for 3 months.

Investigations:

Haemoglobin 110 g/L (130–175)

White cell count  $5.8 \times 10^9/L$  (3.8–10.0)

Platelets  $120 \times 10^9/L$  (150–400)

Corrected calcium 2.90 mmol/L (2.2–2.6)

Albumin 29 g/L (35–50)

Serum electrophoresis: monoclonal Ig kappa peak

Bone marrow biopsy: foci of plasma cells, which account for 18% of all haematopoietic cells

What is the most likely diagnosis?

- A. Acute lymphoblastic lymphoma
- B. Chronic lymphocytic leukaemia
- C. Extramedullary plasmacytoma
- D. Multiple myeloma
- E. Waldenström macroglobulinaemia

**Correct answer: D) Multiple myeloma**

**Justification: The patient has classical clinical and laboratory features of multiple myeloma.**



3. A 54 year old woman has reduced urine output 24 hours after admission with right lower lobe consolidation due to community acquired pneumonia. She has been treated with intravenous amoxicillin and clarithromycin, but remains breathless. Her creatinine was 82  $\mu\text{mol/L}$  (60–120) on admission.

Her temperature is 38.0°C, pulse rate 106 bpm, BP 102/50 mmHg and oxygen saturation 95% breathing 4 L/min oxygen via nasal prongs. Her urine output is 250 mL over the past 12 hours. Her urinalysis has protein 1+.

Investigations:

Haemoglobin	119 g/L	(115–150)
White cell count	$16.9 \times 10^9/\text{L}$	(3.8–10.0)
Platelets	$95 \times 10^9/\text{L}$	(150–400)
Urea	15.5 mmol/L	(2.5–7.8)
Creatinine	160 $\mu\text{mol/L}$	(60–120)

What is the most likely cause of her acute kidney injury?

- A. Drug-induced interstitial nephritis
- B. Haemolytic uraemic syndrome
- C. Infection-related glomerulonephritis
- D. Renal hypoperfusion
- E. Systemic vasculitis

**Correct answer: D) Renal hypoperfusion**

**Justification:** The patient has ongoing sepsis with hypotension which is leading to pre-renal AKI. This clinical pattern may ultimately lead to acute tubular necrosis/tubular injury. None of the other diagnoses fit the clinical picture. Interstitial nephritis would normally not appear until 4-7 days of antibiotic exposure and is relatively rare. Infection related glomerulonephritis is uncommon with pneumonia and there is no evidence of non-visible haematuria. The same applies to systemic vasculitis. Haemolytic uraemic syndrome would have a different clinical picture with marked anaemia and a lower platelet count.



4. A 70 year old woman has an ulcer above the left medial malleolus. She has type 2 diabetes mellitus. She smokes 10 cigarettes per day. Her BMI is 34. The ulcer is 10 × 5 cm and superficial. She has brown discolouration of both lower legs. The skin has a thickened, waxy feel.

Which ulcer type is the most likely?

- A. Arterial
- B. Inflammatory
- C. Malignant
- D. Neuropathic
- E. Venous

**Correct answer: E) Venous**

**Justification:** The site and presence of hyperpigmentation or lipodermatosclerosis are suggestive of venous ulceration. The classic location for these is by medial or lateral malleolus and they are not associated with significant pain.



5. A 67 year old man has 3 weeks of worsening ankle oedema. He has hypertension and takes amlodipine. He is a lifelong heavy smoker and drinks 12 units of alcohol per week.

His BP is 125/85 mmHg and oxygen saturation 98% breathing air. His JVP is 4 cm above the sternal angle. He has marked bilateral pitting ankle oedema. He has dull percussion note at both bases with reduced breath sounds.

Investigations:

Creatinine	85 $\mu$ mol/L	(60–120)
Fasting glucose	5.7 mmol/L	(3.0–6.0)
Total cholesterol	9 mmol/L	(<5.0)
Albumin	15 g/L	(35–50)
Urinary protein:creatinine ratio	568 mg/mmol	(<30)
Urine microscopy	no cells, no casts	

What is the most likely diagnosis?

- A. Cardiac failure
- B. Nephritic syndrome
- C. Nephrotic syndrome
- D. Rapidly progressive glomerulonephritis
- E. Renovascular disease

**Correct answer: C) Nephrotic syndrome**

**Justification:** The combination of hypoalbuminaemia, proteinuria, oedema, hypercholesterolaemia etc. is characteristic of nephrotic syndrome. The most likely causes in the age group (without diabetes) would be membranous nephropathy, minimal change or FSGS. Myeloma would also need to be considered. A renal biopsy would be required to confirm the diagnosis.



6. A 68 year old man has eight weeks of back pain. It sometimes wakes him at night, and he is feeling increasingly tired. He has no history of back problems or recent trauma.

He has tenderness over L3 and L4 vertebrae.

Investigations:

Haemoglobin 137 g/L (130–175)

Erythrocyte sedimentation rate 55 mm/hr (< 20)

Creatinine 72  $\mu$ mol/L (60–120)

Calcium 2.5 mmol/L (2.2–2.6)

Serum protein electrophoresis: no paraprotein

What is the most appropriate next investigation?

- A. CT scan abdomen and pelvis
- B. DEXA scan
- C. HLA-B27 antigen
- D. Isotope bone scan
- E. X-ray lumbar spine

**Correct answer: E) X-ray lumbar spine**

**Justification:** Being woken from sleep is a red flag symptom, as is the duration. At this age and with the persistence of symptoms, spinal tenderness and an elevated ESR it is reasonable to perform imaging. Plain X-rays are appropriate initially, although if negative an MR scan would be indicated.



7. A 17 year old girl has a florid skin rash for 24 hours. She has been feeling unwell for the past week with intermittent abdominal pain.

She has a palpable, purpuric rash on her lower limbs and buttocks. Her temperature is 37.2°C, pulse rate 70 bpm and BP 122/80 mmHg. Her urinalysis has blood 3+, protein 2+, nitrites negative, leucocytes negative.

Investigations:

Haemoglobin	122 g/L	(115–150)
White cell count	$8.9 \times 10^9/\text{L}$	(3.8–10.0)
Platelets	$320 \times 10^9/\text{L}$	(150–400)
Urea	3.2 mmol/L	(2.5–7.8)
Creatinine	60 $\mu\text{mol/L}$	(60–120)

What is the most likely diagnosis?

- A. IgA vasculitis (Henoch–Schönlein purpura)
- B. Meningococcal septicaemia
- C. Microscopic polyangiitis
- D. Postinfectious glomerulonephritis
- E. Systemic lupus erythematosus

**Correct answer: A) IgA vasculitis (Henoch–Schönlein purpura)**

**Justification:** Classic presentation of HSP with a purpuric (vasculitic) rash and an active urinary sediment. Abdominal and joint pain may also occur. Renal function is usually normal. With meningococcal sepsis the patient would be much more unwell. Postinfectious GN would follow a clear-cut infection, particularly streptococcal sore throat. SLE would normally have a longer history, does not typically give a vasculitis rash and would be associated with other features of SLE e.g. alopecia, arthralgia, skin rash, cytopenias, mouth ulcers. Microscopic polyangiitis (ANCA associated normally) is less common in this age group and usually has a longer history.





8. A 67 year old woman becomes unwell whilst attending the diabetes foot clinic. She is anxious and noticeably tremulous as she drinks from her water bottle.

She is sweaty but afebrile. Her pulse rate is 98 bpm, BP 128/76 mmHg and oxygen saturation 96% breathing air. Her capillary blood glucose is 2.1 mmol/L.

What is the most appropriate next step in management?

- A. Intramuscular glucagon
- B. Intravenous 10% glucose
- C. Intravenous 20% glucose
- D. Oral glucose gel (GlucoGel®)
- E. Oral glucose tablets

**Correct answer: E) Oral glucose tablets**

**Justification: She is alert enough to swallow so does not need to be given GlucoGel® but the tablets. JBDS guidelines (Revised Jan 2023).**



9. An 82 year old woman has constipation and passes infrequent, hard stools. She has hypertension, overactive bladder symptoms and type 2 diabetes mellitus. She takes amlodipine, doxazosin, gliclazide, metformin and oxybutynin.

Which medication is most likely to be worsening her constipation?

- A. Amlodipine
- B. Doxazosin
- C. Gliclazide
- D. Metformin
- E. Oxybutynin

**Correct answer: E) Oxybutynin**

**Justification: Oxybutynin is an anticholinergic and a frequent cause of constipation.**



- 10.** A 65 year old man reports sudden onset of visual disturbance with flashing lights, floaters and loss of vision in the upper outer quadrant of his right eye. He has hypertension but reports no previous visual disturbances.

What is the most likely diagnosis?

- A. Acute glaucoma
- B. Central retinal artery occlusion
- C. Central retinal vein occlusion
- D. Retinal detachment
- E. Vitreous haemorrhage

**Correct answer: D) Retinal detachment**

**Justification:** Patients with retinal detachment typically complain of an increasing number of floaters in one eye. As detachment progresses the separating vitreous will tug on the surface of the retina and create a mechanical depolarization of the axons running through the nerve fibre layer of the retina. This leads to flashing lights.



- 11.** A 70 year old woman develops pyrexia and reduced oxygen saturation 2 days after an elective subtotal gastrectomy. Her postoperative pain control has been difficult, which has limited her ability to have chest physiotherapy and to mobilise.

Her temperature is 37.8°C, pulse rate 84 bpm and oxygen saturation 92% breathing 35% oxygen. Her BMI 36. There is reduced breath sounds at both lung bases. Her abdomen is soft, with tenderness around her wound. Her drain has serous output.

What is the most likely postoperative complication?

- A. Anastomotic leak
- B. Atelectasis
- C. Pneumothorax
- D. Pulmonary embolism
- E. Wound infection

**Correct answer: B) Atelectasis**

**Justification:** The development of a fever in the early postoperative period, in combination with reduced oxygen saturation, is most likely to be due to the development of bibasal atelectasis, especially in a patient who has undergone an abdominal procedure and is experiencing pain.



- 12.** A 69 year old man has 6 months of intermittent weakness and numbness in both legs. The symptoms comes on during walking, typically after about 100 metres, and settle after a few minutes with rest. He has found that leaning forwards whilst walking can prevent the symptoms. He can ride a bike slowly without provoking the symptoms. He has diet-controlled type 2 diabetes mellitus. He used to smoke and has a 40 pack-year history.

His BP is 178/95 mmHg. He has weakness of hip flexion bilaterally. His peripheral pulses are palpable.

What is the most likely diagnosis?

- A.** Diabetic amyotrophy
- B.** Lumbar disc prolapse
- C.** Lumbar spinal stenosis
- D.** Osteoarthritis of hips
- E.** Peripheral arterial disease

**Correct answer: C) Lumbar spinal stenosis**

**Justification:** This patient gives a typical history of neurogenic claudication coming on with walking and better leaning forwards (including when riding a bike).



- 13.** A 62 year old man attends the emergency department following a road traffic collision. He has severe bruising of the right upper shoulder from the seat belt, but no other injuries.

Chest X-ray (performed to exclude a pneumothorax) shows a 2 cm mass in the right upper zone.

What is the most appropriate next investigation?

- A.** CT scan of chest
- B.** Lateral chest X-ray
- C.** MR scan of chest
- D.** PET scan of chest
- E.** Technetium bone scan

**Correct answer: A) CT scan of chest**

**Justification: CT would be the most appropriate next investigation of a mass on chest X-ray given the likely diagnosis of lung cancer.**



- 14.** A 28 year old woman returns to the dermatology clinic 2 weeks after surgery to excise a 1.1 cm pigmented lesion on her right lower leg.

The histopathological report states that the lesion is a superficial spreading melanoma with a Clark level 3, Breslow depth 0.9 mm, mitotic index of 1/mm<sup>2</sup> and no ulceration. It has been completely excised.

Which feature provides the most important pathological prognostic indicator?

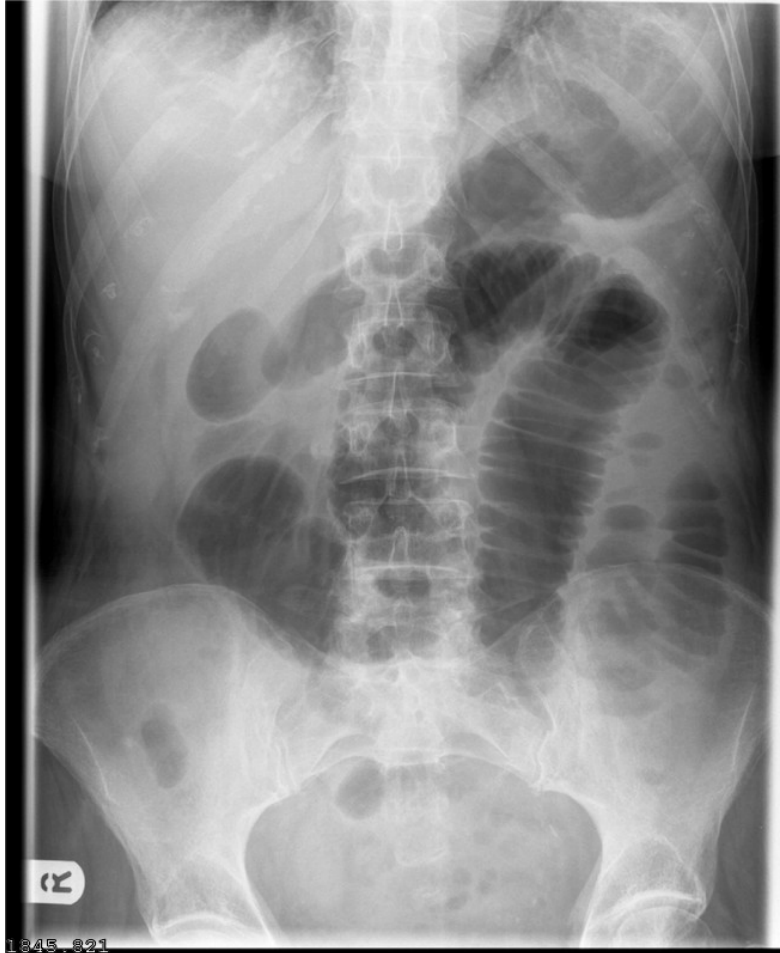
- A. Breslow depth
- B. Clark level
- C. Diameter of lesion
- D. Melanoma subtype
- E. Mitotic index

**Correct answer: A) Breslow depth**

**Justification: A complete full-thickness excisional biopsy of suspicious lesions with 1 to 3 mm margin of normal skin and part of the subcutaneous fat should be performed. Tumour thickness is the single most important prognostic factor for patients with localised melanoma. This is measured as the Breslow depth or thickness.**

15. A 42 year old woman has 12 hours of colicky central abdominal pain, vomiting, abdominal distension and increased bowel sounds. She had a ruptured appendix aged 20 years.

Plain abdominal X-ray: see image.



What is the most appropriate initial management?

- A. Flatus tube insertion
- B. Intravenous antibiotics
- C. Laparoscopy
- D. Laparotomy
- E. Nasogastric tube insertion

**Correct answer: E) Nasogastric tube insertion**

**Justification:** The patient has small bowel obstruction due to adhesions from her previous appendicitis. This is treated conservatively with fluid resuscitation and nasogastric decompression of the gut. The stomach





**contents should be aspirated using a syringe, following which the bag should be placed on free drainage. Further aspiration may be needed if required. Conservative management is successful in 65-80% of cases and surgical intervention is only considered for those patients who do not improve with conservative management. Surgically dividing adhesions creates further raw surfaces on which adhesions may form during the healing process and hence is avoided wherever possible. Intravenous antibiotics are not indicated in cases managed conservatively. Upper GI endoscopy has no role in the management of this case.**



**16.** A 59 year old woman has loin pain and dysuria.

Her temperature is 39°C, pulse rate 108 bpm, BP 90/60 mmHg and respiratory rate 18 breaths per minute.

Investigations:

Haemoglobin	130 g/L	(115–150)
White cell count	$22.0 \times 10^9/\text{L}$	(3.8–10.0)
Platelets	$40 \times 10^9/\text{L}$	(150–400)
PT	20 seconds	(10–12)
APTT	60 seconds	(22–41)
Fibrinogen	1.0 g/dL	(1.5–4.0)

What is the most likely explanation for her thrombocytopenia?

- A. Disseminated intravascular coagulation
- B. Haemophilia B
- C. Immune thrombocytopenic purpura
- D. Vitamin B12 deficiency
- E. von Willebrand disease

**Correct answer: A) Disseminated intravascular coagulation**

**Justification:** The clotting abnormalities are consistent with acute DIC due to complicated urosepsis. typically patients have thrombocytopenia, prolonged PT and aPTT, low plasma fibrinogen and an elevated plasma D-dimer. There may also be microangiopathic abnormalities on the blood smear.



**17.** A 22 year old man attends the emergency department having briefly lost consciousness. He had gone to bed after a party and been woken at 03:00 by the need to pass urine. He remembers feeling faint and nauseated while bearing down to pass urine, lost consciousness and fell to the floor.

Examination and ECG are normal.

What is the most likely diagnosis?

- A. Alcohol related seizure
- B. Cardiac dysrhythmia
- C. Ecstasy toxicity
- D. Hypoglycaemia
- E. Micturition syncope

**Correct answer: E) Micturition syncope**

**Justification:** This is a classical history for micturition syncope. There is nothing to suggest seizure activity as the episode was only brief with no suggestion of post ictal confusion. The normal ECG means it is very unlikely to have been a cardiac dysrhythmia in a 22 year old. Hypoglycaemia would not spontaneously resolve without treatment. This is not the presentation of ecstasy toxicity.



- 18.** A 45 year old man with pain caused by cancer has been using opioids to control his pain very successfully. He is taking a regular dose of MST Continus® 60 mg 12-hourly orally. He has been using three breakthrough doses (oral morphine 20 mg) per day for the past week.

What is the most appropriate opioid prescription?

- A.** Diamorphine 60 mg subcutaneously over 24 h by syringe driver
- B.** Morphine 90 mg subcutaneously over 24 h by syringe driver
- C.** MST Continus® 60 mg 12-hourly and morphine 30 mg as required (up to 4-hourly) orally
- D.** MST Continus® 90 mg 12-hourly and morphine 20 mg as required (up to 4-hourly) orally
- E.** MST Continus® 90 mg 12-hourly and morphine 30 mg as required (up to 4-hourly) orally

**Correct answer: E) MST Continus® 90 mg 12-hourly and morphine 30 mg as required (up to 4-hourly) orally**

**Justification:** The breakthrough dose should be one-sixth of the total daily dose. The current daily morphine dose is 180 mg, hence MST continues at 90 mg 12 hourly and the breakthrough at morphine 30 mg.

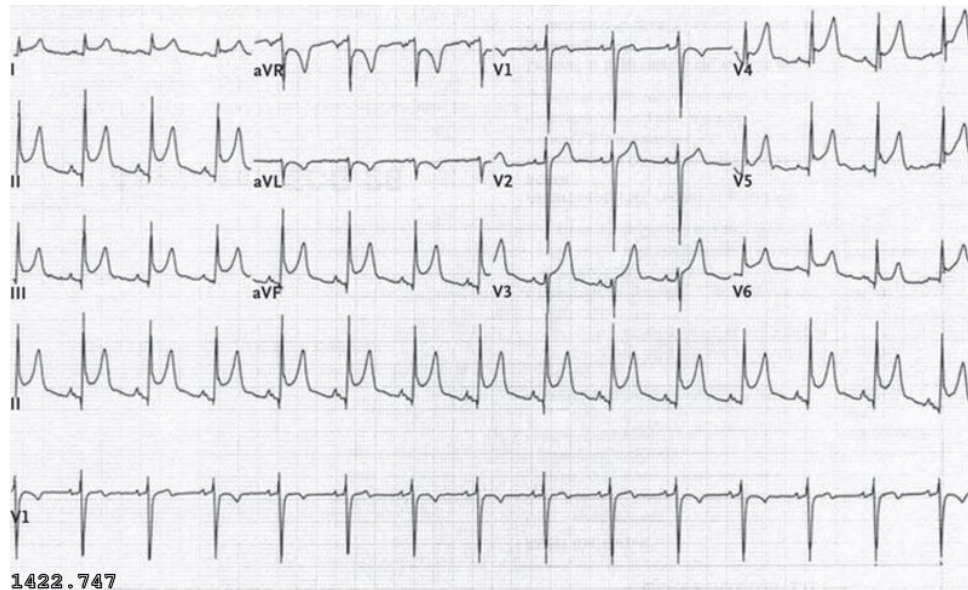


19. A 25 year old man has left-sided chest pain that is worsened by lying back and when he takes a deep breath. He has had a recent respiratory tract infection.

Investigations:

Troponin T 5 ng/L (<12)

ECG: see image



What is the most likely diagnosis?

- A. Pericardial effusion
- B. Pericarditis
- C. Pulmonary embolism
- D. ST-elevation myocardial infarction
- E. Unstable angina

**Correct answer: B) Pericarditis**

**Justification:** The history and ECG changes (widespread PR depression and ST elevation) are strongly suggestive of pericarditis. A pericardial effusion would produce low-voltage complexes on the ECG.



**20.** An 18 year old woman has 6 hours of severe dizziness and nausea. She says that the room is constantly spinning round and she has vomited several times. The dizziness is worse when she opens her eyes. She reports that her hearing has not changed.

She has nystagmus with the fast phase to the left, which does not fatigue.

What is the most likely diagnosis?

- A. Benign positional vertigo
- B. Cerebellar tumour
- C. Ménière disease
- D. Vestibular migraine
- E. Vestibular neuronitis

**Correct answer: E) Vestibular neuronitis**

**Justification:** The most likely diagnosis is vestibular neuronitis as this is a single episode in an 18-year-old. The diagnoses of vestibular migraine and benign positional vertigo would not be considered unless the attacks were recurrent.



**21.** A 60 year old man attends his GP as he wants to start training for a 5 km race for charity. He plans to run 3 to 5 km three times per week. He describes occasional central chest tightness when he walks up hills. He has type 2 diabetes mellitus and COPD, and takes metformin and inhaled salbutamol as-required.

His BP is 162/94 mmHg. His BMI is 32.

Which aspect of his clinical background is a contra-indication to his training plan?

- A. BP >160/90 mmHg
- B. COPD
- C. Exertional chest tightness
- D. Obesity
- E. Type 2 diabetes mellitus

**Correct answer: C) Exertional chest tightness**

**Justification:** The presence of exertional chest pain indicates a high likelihood of undiagnosed ischaemic heart disease. Vigorous exercise runs the risk of a significant ischaemic event including a myocardial infarct or arrhythmia.



**22.** A 75 year old man attends his GP with one episode of visible haematuria.

His temperature is 36.2°C and BP 142/80 mmHg. Urinalysis shows blood 2+, leucocytes negative, protein negative, nitrite negative.

Investigations:

Midstream urine: red blood cells and epithelial cells, no microbial growth

What is the most appropriate next step?

- A.** Arrange an ultrasound scan of renal tract
- B.** Arrange CT urography
- C.** Check serum prostate specific antigen
- D.** Refer for urology opinion
- E.** Repeat midstream urine sample for culture and sensitivity

**Correct answer: D) Refer for urology opinion**

**Justification:** This is because the patient may have transitional cell carcinoma of the bladder and thorough investigation of haematuria is urgent to rule this out.





- 23.** A 73 year old man has 3 months of increasing weakness of his right hand with reduced sensation of the forearm.

There is wasting of all the intrinsic muscles of the right hand. There is weakness of finger abduction and adduction, and thumb adduction. Finger flexion is normal. There is mild altered light touch sensation along the ulnar aspect of the forearm. The biceps, supinator and triceps reflexes are normal. The lower limbs and the left arm are normal.

Where is the most likely site of the lesion causing his symptoms?

- A. Median nerve in the forearm
- B. Median nerve in the wrist
- C. Spinal cord C8 level
- D. T1 nerve root
- E. Ulnar nerve at the elbow

**Correct answer: D) T1 nerve root**

**Justification:** The intrinsic hand muscle wasting suggests T1. The normal reflexes and normal other arm are against a cord lesion. The sensory loss on the forearm excludes median and ulnar nerve lesions. T1 dermatome is often thought to be higher in the arm medially.



**24.** An 84 year old woman was admitted 24 hours ago following a fall in her home. She has mild dementia and osteoarthritis. She takes donepezil and ibuprofen.

Her temperature is 36.2°C, pulse rate 77 bpm and BP 152/88 mmHg. Her abbreviated mini-mental test score is 6/10. She has bruising on her face.

A midstream urine culture result 24 hours later shows a mixed growth of organisms with no leucocytes.

What is the most likely explanation for the midstream urine culture result?

- A. Bladder carcinoma
- B. Colovesical fistula
- C. Contaminated urine specimen
- D. Cystitis
- E. Interstitial nephritis

**Correct answer: C) Contaminated urine specimen**

**Justification: A mixed growth in a urine specimen is usually a result of contamination. There are no features to suggest any other underlying urinary, renal or GI problems or any evidence of infection, especially with the lack of leucocytes.**



**25.** A 70 year old woman has 6 weeks of generalised shoulder and hip pain and stiffness. She feels excessively tired.

Her temperature is 37.5°C. She has reduced range of movement at the shoulders, but no muscle tenderness. There is synovial thickening and tenderness at the right wrist.

Investigations:

Erythrocyte sedimentation rate 85 mm/hr (<20)

Creatine kinase 110 U/L (25–175)

What is the most appropriate treatment?

- A. Allopurinol
- B. Hydroxychloroquine
- C. Ibuprofen
- D. Prednisolone
- E. Sulfasalazine

**Correct answer: D) Prednisolone**

**Justification:** This is because the clinical scenario is that of a patient with polymyalgia rheumatica based on the age, pattern of muscle weakness and raised ESR. Muscle enzymes are normal in patients with polymyalgia rheumatica. The treatment for polymyalgia rheumatica is corticosteroids.



**26.** A 53 year old man has increasing abdominal swelling over several weeks, with severe abdominal pain developing over the past 12 hours. He drinks one to two bottles of vodka per day.

He has jaundice. His temperature is 37.6°C. He has spider naevi and prominent veins on his abdominal wall. His abdomen is diffusely tender.

Investigations:

Haemoglobin	136 g/L	(130–175)
White cell count	$9.6 \times 10^9/L$	(3.8–10.0)
Platelets	$160 \times 10^9/L$	(150–400)
INR	1.2	(1.0)
ALT	350 IU/L	(10–50)
ALP	140 IU/L	(25–115)
Bilirubin	78 $\mu\text{mol/L}$	(<17)

Ultrasound scan of abdomen shows ascites with mild hepatosplenomegaly.

What is the most appropriate next step?

- A. Ascitic tap
- B. CT scan of abdomen
- C. Hepatitis serology
- D. Percutaneous liver biopsy
- E. Ultrasound scan of abdomen

**Correct answer: A) Ascitic tap**

**Justification:** Spontaneous bacterial peritonitis (SBP) should be suspected in patients with ascites due to cirrhosis who develop symptoms such as fever, abdominal pain or tenderness, and confusion. The signs and symptoms are more subtle compared with those seen in patients with standard bacterial peritonitis. It is important not to miss SBP as delayed recognition is associated with a high mortality.



**27.** A 65 year old woman has had a painful, red and watery left eye for 3 days.

Visual acuity is 6/24 on the left and 6/12 on the right. Fundoscopy is normal.

What is the most appropriate next step in management?

- A.** Arrange ophthalmology outpatient appointment
- B.** Prescribe chloramphenicol eye drops
- C.** Prescribe prednisolone eye drops
- D.** Prescribe sodium cromoglicate eye drops
- E.** Refer to the ophthalmology department as an emergency

**Correct answer: E) Refer to the ophthalmology department as an emergency**

**Justification: Painful eye with loss of acuity needs urgent ophthalmology assessment.**



**28.** A 75 year old man with metastatic prostate cancer develops lumbar discomfort, weakness in both legs and urinary incontinence.

His strength is 2/5 in all the lower limb muscle groups. He has bilateral extensor plantar reflexes, and sensation to pinprick is reduced below the umbilicus.

What is the most appropriate immediate treatment?

- A. Dexamethasone
- B. Gabapentin
- C. Morphine sulfate
- D. Spinal decompression
- E. Spinal radiotherapy

**Correct answer: A) Dexamethasone**

**Justification:** The patient has likely malignant spinal cord compression. Glucocorticoids are standard initial treatment both to treat pain and reduce neurological deficit. This allows definitive investigation to be performed, and treatment planned. Standard treatment would be a loading dose of dexamethasone (16 mg IV or PO), followed by 8 mg bd.



**29.** A 45 year old woman notices a painless breast lump while showering. She is seen urgently in the breast clinic for triple assessment.

What is the best description of this type of assessment?

- A.** Clinical examination, breast imaging and bone scan
- B.** Clinical examination, breast imaging and core biopsy
- C.** MR scan, bone scan and excision biopsy
- D.** MR scan, genetic screening and excision biopsy
- E.** PET scan, genetic screening and core biopsy

**Correct answer: B) Clinical examination, breast imaging and core biopsy**

**Justification:** Triple assessment involves clinical examination, breast imaging (usually mammography and ultrasound) followed by biopsy to achieve a pathological diagnosis.



**30.** A 52 year old man attends the hypertension clinic with an average daytime ambulatory BP monitoring reading of 164/105 mmHg. He has been previously well and currently takes no medication. He is of African–Caribbean ethnicity.

In clinic, his BP is 158/98 mmHg. His 10-year cardiovascular risk is calculated to be 23%.

In addition to atorvastatin, what is the most appropriate medication to prescribe?

- A. Amlodipine
- B. Bendroflumethiazide
- C. Doxazosin
- D. Losartan potassium
- E. Ramipril

**Correct answer: A) Amlodipine**

**Justification:** Patients with Stage 2 hypertension and should offered drug treatment. As he is of African–Caribbean descent, the first line treatment is a calcium channel blocker.

**NICE guideline [NG136] Published: 28 August 2019 Last updated: 21 November 2023**

<https://www.nice.org.uk/guidance/ng136/chapter/Recommendations>





- 31.** The association between low birth weight babies and maternal smoking during pregnancy is studied by obtaining smoking histories from women at the time of their first prenatal visit, then assessing birth weight at delivery and analysing according to the smoking histories.

What is the best description of this type of study?

- A.** Case control
- B.** Case series
- C.** Clinical trial
- D.** Cross-sectional
- E.** Prospective cohort

**Correct answer: E) Prospective cohort**

**Justification: A prospective cohort study is a longitudinal cohort study that follows over time a group of similar individuals (i.e. babies) who differ with respect to certain factors under study (i.e. maternal smoking history), to determine how these factors affect rates of a certain outcome (i.e. birth weight).**



- 32.** A 60 year old woman is found drowsy and confused. She has been unwell for 2–3 days with diarrhoea and vomiting. She has bipolar disorder. She takes lithium, risperidone and co-codamol.

Her temperature is 37.3°C, pulse rate 94 bpm, BP 122/70 mmHg, respiratory rate 14 breaths per minute and oxygen saturation 99% breathing high-flow oxygen. Her GCS score is 12/15. She has coarse tremor in her arms and jerking movements of her legs.

What is the most likely diagnosis?

- A. Hyponatraemia
- B. Lithium toxicity
- C. Neuroleptic malignant syndrome
- D. Opioid toxicity
- E. Subdural haematoma

**Correct answer: B) Lithium toxicity**

**Justification:** The patient displays classic features of lithium toxicity (confusion, coarse tremor, jerking leg movements), likely precipitated by dehydration secondary to diarrhoea and vomiting.



**33.** A 42 year old woman has 3 months of weight loss, insomnia, and palpitations. She has a fine resting tremor and bilateral proptosis.

What is the most likely underlying pathological mechanism?

- A.** Antibody directed against the thyroid stimulating hormone receptor
- B.** Antibody directed against thyroid peroxidase
- C.** Autonomous activity of thyroid follicular cells
- D.** Destruction of thyroid cells by lymphocytes
- E.** Excess production of thyroid stimulating hormone

**Correct answer: A) Antibody directed against the thyroid stimulating hormone receptor**

**Justification: The clinical picture fits with Graves disease. It is caused by autoantibodies to the thyroid stimulating hormone receptor (a.k.a thyrotropin receptor antibody, TRAb) that activates the receptor, stimulating thyroid hormone synthesis and secretion and a goitre.**



**34.** A 53 year old woman has 6 months of worsening tiredness.

She has jaundice, xanthelasma and 7 cm non-tender hepatomegaly.

Investigations:

INR 1.2 (1.0)

ALT 60 IU/L (10–50)

ALP 302 IU/L (25–115)

Bilirubin 50  $\mu\text{mol/L}$  (<17)

Antinuclear antibodies 1:40 (negative at 1:20)

Antimitochondrial antibodies 1:320 (negative at 1:20)

Ultrasound scan of abdomen hepatosplenomegaly, no biliary dilatation

What is the most appropriate treatment?

- A. Azathioprine
- B. Lamivudine
- C. Prednisolone
- D. Thiamine
- E. Ursodeoxycholic acid

**Correct answer: E) Ursodeoxycholic acid**

**Justification:** The clinical picture fits a diagnosis of primary biliary cholangitis (previously primary biliary cirrhosis) (raised ALP, AMA positive with no evidence of obstruction. There is good evidence that Ursodeoxycholic acid should be prescribed for all patients with this diagnosis. A biopsy is not required to make the diagnosis.



- 35.** A 91 year old woman is admitted from a nursing home with 3 days of vomiting and diarrhoea.

Her pulse is 110 bpm. Her BP is 116/66 mmHg lying in bed, with a postural BP drop of 30 mmHg when sitting.

Investigations:

Sodium	130 mmol/L	(135–146)
Potassium	4.0 mmol/L	(3.5–5.3)
Bicarbonate	20 mmol/L	(22–29)
Urea	25.6 mmol/L	(2.5–7.8)
Creatinine	177 µmol/L	(60–120)

What is the most appropriate initial intravenous fluid?

- A.** 0.9% sodium chloride
- B.** 1.4% sodium bicarbonate
- C.** 1.8% sodium chloride
- D.** 4% glucose, 0.18% sodium chloride
- E.** 5% glucose

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

**Justification:** The patient is hypovolaemic and needs IV fluid resuscitation. guidelines recommend using crystalloids that contain sodium in the range 130–154 mmol/l, with a bolus of 500 ml over less than 15 minutes (NICE guideline CG174).



**36.** A 30 year old man has 3 months of intermittent but worsening headaches. He takes paracetamol and ibuprofen as required.

His BP is 220/130 mmHg.

Investigations:

Sodium 144 mmol/L (135–146)

Potassium 3.0 mmol/L (3.5–5.3)

Urea 7.0 mmol/L (2.5–7.8)

Creatinine 92  $\mu$ mol/L (60–120)

Which is the most likely underlying diagnosis?

- A. Addison disease
- B. Chronic kidney disease
- C. Cushing disease
- D. Pheochromocytoma
- E. Primary aldosteronism (Conn syndrome)

**Correct answer: E) Primary aldosteronism (Conn syndrome)**

**Justification:** Conn syndrome is the commonest endocrine cause of hypertension and much more common than Cushing's/Phaeo. The classic presenting signs of primary aldosteronism are hypertension and hypokalemia, although the latter is not present in all cases. The diagnosis should also be considered in those with severe hypertension (>150/100 mmHg), hypertension with sleep apnoea and hypertension with a family history of early onset hypertension.



**37.** A 24 year old man has acute breathlessness and lightheadedness. He was admitted 24 hours ago following a car accident. He had multiple pelvic fractures and compound fractures of both tibia, requiring surgical fixation.

He is on intravenous morphine via a patient-controlled analgesia device, prophylactic low molecular weight heparin, intravenous flucloxacillin and intravenous 0.9% saline at 120 mL/hour.

He is confused and disorientated. His temperature is 36.4°C, pulse rate 100 bpm, BP 110/60 mmHg, respiratory rate 30 breaths per minute and oxygen saturation 85% breathing 4 L/min oxygen via nasal prongs. His chest is clear.

What is the most likely diagnosis?

- A. Cardiac tamponade
- B. Fat embolism syndrome
- C. Opiate toxicity
- D. Pulmonary embolus
- E. Subdural haematoma

**Correct answer: B) Fat embolism syndrome**

**Justification:** Classic presentation of fat emboli. Multiple fractures followed by early onset (within 24 hours) of hypoxia, dyspnoea, and tachypnoea are the most frequent findings. Neurologic manifestations range from the development of an acute confusional state and altered level of consciousness to seizures and focal deficits and usually follow respiratory symptoms. A petechial rash is the last component to appear and only appears in about a third of cases. Patients with PE may present in the same time frame (i.e., 24 to 72 hours), but neurologic abnormalities are not explained by this.



**38.** A 46 year old man has a cardiac arrest in the emergency department after an episode of chest pain. He remains in ventricular fibrillation after three DC shocks, and he is treated with a bolus of intravenous adrenaline/epinephrine.

What other drug treatment should be administered at the same time?

- A. Alteplase
- B. Amiodarone hydrochloride
- C. Atropine sulfate
- D. Lidocaine
- E. Magnesium sulfate

**Correct answer: B) Amiodarone hydrochloride**

**Justification:** If VF/VT persists after a third shock, resume chest compressions immediately and then give adrenaline 1 mg IV and amiodarone 300 mg IV while performing a further 2 min CPR.

**2021 Resuscitation Guidelines**

<https://www.resus.org.uk/library/2021-resuscitation-guidelines/adult-advanced-life-support-guidelines>





- 39.** An 18 year old man has 3 weeks of malaise, fever and headaches and 1 week of a sore throat.

His temperature is 37.6°C, pulse 84 bpm, BP 120/82 mmHg and respiratory rate 12 breaths per minute. He has large tonsils with exudate, a petechial rash on the palate, and axillary and inguinal lymphadenopathy.

Investigations:

White cell count             $11.2 \times 10^9/L$  (3.8–10.0)

Lymphocytes                 $5.5 \times 10^9/L$  (1.1–3.3)

ALT                            72 IU/L        (10–50)

AST                            45 IU/L        (10–40)

Alkaline phosphatase    91 IU/L        (25–115)

Bilirubin                    16  $\mu\text{mol/L}$  (<17)

What is the most appropriate investigation to confirm the diagnosis?

- A. Anti-streptolysin O titre
- B. Blood cultures
- C. Epstein–Barr virus serology
- D. Hepatitis A serology
- E. Throat swab

**Correct answer: C) Epstein–Barr virus serology**

**Justification:** This is a typical clinical picture of glandular fever in the usual age group. Epstein-Barr virus (EBV)-induced infectious mononucleosis (IM) should be suspected when a young adult complains of sore throat, fever, and malaise and also has lymphadenopathy and pharyngitis. The presence of palatal petechiae is also characteristic. Lymphocytosis is usually seen in the FBC. The diagnosis can be confirmed through EBV specific antibodies.



**40.** A 74 year old man is brought to the emergency department after falling down the stairs. He has no pain. He has atrial fibrillation and takes apixaban.

He has significant bruising to the left side of his face and left arm. His pulse is 80 bpm, irregular, BP 150/95 mmHg and oxygen saturation 96% breathing air. His GCS score is 14.

What is the most appropriate next step in management?

- A.** Cervical spine immobilisation
- B.** Chest X-ray
- C.** CT of head
- D.** Intravenous prothrombin complex
- E.** Intravenous vitamin K

**Correct answer: A) Cervical spine immobilisation**

**Justification:** This is because sequence of care for potential trauma patient is airway and cervical spine. There is no mention of a collar so this should be applied. This would need to be done before any of the other options. A CT scan head will be required and a chest X-ray likely. Vitamin K would not have a role and the use of prothrombin complex or other reversal agents would depend on the results of subsequent investigations.



**41.** A 17 year old boy has repeated episodes characterised by a funny 'racing' sensation in his abdomen, followed by loss of awareness. His girlfriend describes that he has a vacant stare and waves his left arm around in a writhing manner during these attacks.

Which is the most likely site of origin of these episodes?

- A. Cerebellum
- B. Right frontal lobe
- C. Right occipital lobe
- D. Right parietal lobe
- E. Right temporal lobe

**Correct answer: E) Right temporal lobe**

**Justification: He has focal onset impaired awareness seizures, the aura implicates one of the temporal lobes. In the seizure itself he waves his left arm, suggesting spread to the right frontal lobe (though the origin is elsewhere).**



**42.** A 45 year old woman is feeling unwell with a severe sore throat. She has schizophrenia and started taking clozapine 4 months ago.

Her temperature is 39.0°C. She has an ulcerated throat with tonsillar exudate.

Blood cultures have been sent.

What additional investigation is most likely to establish the underlying cause?

- A. Clozapine concentration
- B. Creatine kinase
- C. Full blood count
- D. Lumbar puncture
- E. Throat swab

**Correct answer: C) Full blood count**

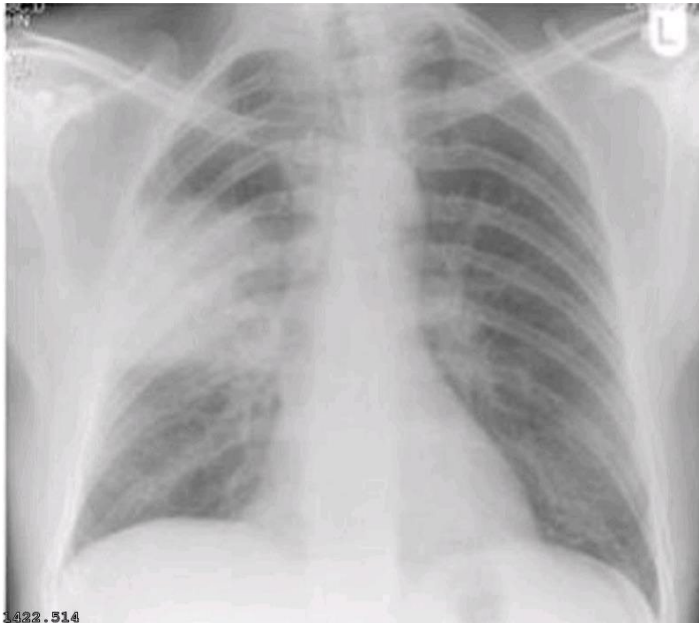
**Justification: Risk of agranulocytosis on clozapine - potential medical emergency. Clozapine induced agranulocytosis occurs in around 1% of patients and usually occurs between 6-18 weeks of initiation of therapy.**



43. A 34 year old man has 3 days of fever, sweats and productive cough, bringing up brown sputum.

His temperature is 38.8°C. He has bronchial breathing over the right mid zone.

His chest X-ray is shown (see image).



What is the most likely pathogen?

- A. Haemophilus influenzae
- B. Legionella pneumophila
- C. Mycoplasma sp.
- D. Staphylococcus aureus
- E. Streptococcus pneumoniae

**Correct answer: E) Streptococcus pneumoniae**

**Justification:** The clinical and radiological findings are typical of **Streptococcus pneumonia**. In this age group with strep pneumonia is the most common. Its incidence in older patients may be reduced by increasing use of pneumococcal vaccination in patients with underlying respiratory disease or immunoconpromise.



**44.** A 38 year old man has 3 months of cough with bloodstained sputum.

A sputum analysis is positive for *Mycobacterium tuberculosis*.

He is treated with quadruple antituberculous therapy. Two weeks later he reports that he is passing orange urine.

Which is the medication most likely to be responsible for his orange urine?

- A. Ethambutol
- B. Isoniazid
- C. Pyrazinamide
- D. Pyridoxine
- E. Rifampicin

**Correct answer: E) Rifampicin**

**Justification:** Rifampicin typically causes an orange or red-orange discolouration of body fluids (including urine, sweat, saliva, and tears). The patient should be warned of this possibility.



**45.** A 46 year old woman attends the emergency department with fever, headache and confusion, which developed over several hours. She finds it impossible to lift her head from the pillow and resists the doctor's attempts to feel her neck.

Her temperature is 38.1°C, pulse 105 bpm and BP 110/60 mmHg. Her GCS score is 14.

A CT scan of her head is normal. A lumbar puncture is performed.

What are the most likely observations in the cerebrospinal fluid?

- A.** High pressure, normal protein, excess red cells
- B.** High pressure, raised protein, excess neutrophils
- C.** Normal pressure, normal protein, excess lymphocytes
- D.** Normal pressure, raised protein, excess neutrophils
- E.** Normal pressure, normal protein, no cells

**Correct answer: B) High pressure, raised protein, excess neutrophils**

**Justification: This is because she has typical bacterial meningitis- fever, neck pain, confusion. A high pressure acute inflammatory exudate is typical.**



**46.** A 51 year old woman attends her GP with 6 months of dry mouth and gritty eyes. She has had vitiligo for 10 years.

Both parotid glands are mildly enlarged.

What is the most likely diagnosis?

- A. Graves disease
- B. Pleomorphic adenoma
- C. Sarcoidosis
- D. Sialolithiasis (salivary gland calculi)
- E. Sjögren syndrome

**Correct answer: E) Sjögren syndrome**

**Justification: Sjögren syndrome can be associated with other autoimmune conditions (e.g. vitiligo) and typically affects tear ducts and salivary glands. The length of the clinical history is too long for acute infection. Sarcoidosis is associated with widespread lymphadenopathy, including parotid involvement, but is not typically associated with sicca symptoms.**





**47.** A 62 year old man has 1 year of intermittent heartburn and difficulty in swallowing.

An endoscopic biopsy of the oesophagus 5 cm above the anatomical gastro oesophageal junction is reported as showing 'columnar epithelium containing goblet cells and Paneth cells'.

What is the most appropriate pathological description of the features noted?

- A. Hyperplasia
- B. Hypertrophy
- C. Intestinal metaplasia
- D. Intraepithelial neoplasia
- E. Squamous metaplasia

**Correct answer: C) Intestinal metaplasia**

**Justification: This is because the combination of goblet cells and Paneth cells is characteristic of (small) intestinal metaplasia.**



- 48.** A 64 year old man is admitted to the emergency department with acute dyspnoea. His exercise tolerance has been limited by breathlessness for several years.

Investigations:

Arterial blood gas breathing air:

pH 7.20 (7.35–7.45)

PO<sub>2</sub> 8 kPa (11–15)

PCO<sub>2</sub> 8.1 kPa (4.6–6.4)

Bicarbonate 23 mmol/L (22–30)

Base excess –4 mmol/L (–2 to +2)

What is the best interpretation of the arterial blood result?

- A. Acute type 1 respiratory failure
- B. Acute type 2 respiratory failure
- C. Chronic type 1 respiratory failure
- D. Chronic type 2 respiratory failure
- E. Metabolic acidosis

**Correct answer: B) Acute type 2 respiratory failure**

**Justification:** This is because the hypoxaemia and retention of CO<sub>2</sub> resulting in a low pH is typical of an acute on chronic hypoxia of COPD. The normal [HCO(3)-] excludes a primary metabolic cause.