

PTS 2a Mock SBA Series 2020

Paper 1- [Answers]- Version 3



Marking Instructions:

- Award **1 mark** for each question on the paper
- Multiple 'correct' answers may exist, a mark is awarded for the **single best answer**
- There are **100 marks** in total.
- There is **no identified 'pass mark'**.

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Please **do not share** this document on **google drives** or **directly** to **future 2a students**, this takes away from their opportunity to complete the mock SBA in the run up to their exams when it has maximal impact as a revision resource. **This mock paper will be repeated for future years.** Thank you.

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Paper 1- Topics Assessed

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Cardiovascular

Question 1- Answer: B – Aspirin and Ticagrelor

Patients with MI require dual antiplatelet therapy consisting of aspirin and a P2Y12 inhibitor (e.g. clopidogrel, ticagrelor or prasugrel). Note that warfarin (D) and dalteparin (E) are not antiplatelet therapies, they prevent venous clotting and hence are often prescribed in situations such as DVT, PE or AF. Acute Coronary Syndromes suggests immediate management of STEMI involves: use of GTN spray, administer O2 (only if hypoxaemic, pulmonary oedema or continuing myocardial ischaemia) analgesia- (e.g morphine and a co-prescribed antiemetic), dual antiplatelet therapy (aspirin and clopidogrel/ticagrelor), restore patency to occluded artery (PCI or thrombolytic drug).

<https://bnf.nice.org.uk/treatment-summary/acute-coronary-syndromes.html>

Question 2- Answer A – Inhibition of aldosterone receptor in the distal tubules

(B) inhibition of cyclooxygenase enzymes in proximal tubules= COX inhibitor e.g Aspirin. (C) Inhibition of L-type voltage gated calcium channel in the nephron= calcium channel blocker e.g Amlodipine. (D) inhibition of the sodium chloride transporter in the distal convoluted tubule= thiazide-like diuretic e.g Bendroflumethiazide. (E) Inhibition of the sodium/potassium/chloride symporter in the loop of Henle= loop diuretics e.g furosemide.

Question 3- Answer A- Caucasian race

High caffeine consumption, sedentary lifestyle, smoking and type A personality are all associated with an increased risk of developing hypertension. Note that from the hypertension management guidelines afro-Caribbean race carries an increased risk of hypertension (<55/Afro-Caribbean = ACEi first line).

Question 4- Answer D – Mitral regurgitation

Aortic stenosis would present with syncope and angina, and on auscultation an ejection systolic murmur would be heard. Aortic regurgitation would present with symptoms to similar symptoms as aortic stenosis, with an early diastolic/Austin Flint murmur heard on auscultation. Mitral stenosis would present with similar symptoms to mitral regurgitation, but with a diastolic murmur on auscultation. Tricuspid regurgitation may present with signs of right-sided heart failure, this pansystolic murmur is not heard at the apex but at the left lower sternal edge.

https://en.wikipedia.org/wiki/Heart_murmur

Question 5- Answer C – ST depression

Myocardial infarction ECG changes include: ST elevation, ST depression (C), T wave inversion, abnormal Q wave. Absent P waves (A) are typically seen in SVT, atrial fibrillation, atrial flutter. Tall tented T waves (D) are characteristic of hyperkalaemia. QT prolongation (B) can be a side effect of medications e.g amiodarone and certain antibiotics. (E) Wide QRS complexes are typically seen in patients with bundle branch blocks.

Question 6- Answer E – Ramipril

A blood pressure over 135/85 recorded by ambulatory BP monitoring requires pharmacological management therefore (C) lifestyle changes only is incorrect.

John is caucasian and under 55 so first line is an ACE inhibitor such as ramipril (E). If John was Afro-Caribbean or over 55 he would be started on a calcium channel blocker like amlodipine (A). If John was intolerant to ramipril he could be started on an angiotensin receptor blocker such as losartan (D). If John's BP did not respond to treatment with an ACE inhibitor or ARB he could be started on a thiazide-like diuretic, for example Bendroflumethiazide (B).

Question 7- Answer A – Atrial fibrillation

This patient has the classical symptoms of a stroke. AF (A) increases the risk of stroke due to blood collecting in the atria and forming clots. Cor pulmonale (B) is right sided heart failure and presents with shortness of breath. Myocardial infarction (E) would most commonly present with symptoms like chest pain, nausea, and sweating. Left bundle branch block (D) is normally asymptomatic and is diagnosed by ECG changes. Infective endocarditis (C) can cause stroke however, it is much rarer than AF and you would expect other indications in the history of IE such as fever, new murmur, Janeway lesions, Osler's nodes, splinter haemorrhages etc.

Question 8- Answer- B – QRISK2 score

ABCD² is used to determine stroke risk after a TIA. CHA₂DS₂-VASc is used to calculate stroke risk in patients with AF. COVID19 is not a score. Wells score is used to determine the risk of DVT or PE (note, different wells scores respectively).

Question 9- Answer B- The risk of a heart attack in the statin group was 1.65% compared to 2.67% in the placebo group, therefore statins decrease the risk of heart attack by 61%.

Statin reduce the risk of heart attack therefore it is to be expected that in the trial a smaller percentage of heart attacks to occur in the statin group compared to the placebo group. (B) describes the relative risk reduction ($1.65/2.67 \times 100 = 61\%$) whereas (A) describes the absolute risk reduction ($2.67 - 1.65 = 1.02$). (C) is describing the number needed to treat (NNT) of statins. D is describing the number needed to harm (NNH) of placebo. E is describing the concept of a 95% confidence interval.

Question 10- Answer D - SA node -> atria -> AV node -> bundle of His -> Purkinje fibres -> L and R bundle branches -> ventricles

D correctly describes the route of electrical conduction through the heart.

Endocrine**Question 11- Answer D- Spironolactone**

You can think of Conn's syndrome as having 3 key aspects (hypertension associated with hypokalaemia, hypertension despite being on 3 or more antihypertensives, hypertension before 40 years of age). Spironolactone is a potassium sparing diuretic so it will retain the K⁺ ions in your body. Conn's syndrome is hyperaldosteronism thus an increase in aldosterone will increase sodium retention. This subsequently will increase water retention causing hypertension. Simultaneously, aldosterone also causes increased potassium excretion.

Question 12- Answer D- Secondary Hyperaldosteronism

If both renin and aldosterone are raised then it is most likely that a renin secreting tumour is present. This will increase the level of renin thus feedback mechanism would lead to an increase of aldosterone. In Addison's aldosterone levels go down. Catatonic state is a psychiatric state. Hypertension has no effect on aldosterone or renin nor does pseudo pseudohypoparathyroidism. The table below shows the levels of renin and aldosterone in primary and secondary hyperaldosteronism and the differential diagnosis.

	Renin	Aldo	Ddx
Primary	↓	↑	adrenal adenoma/carcinoma, adrenal hyperplasia syndromes
Secondary	↑	↑	RAS, low effective circulating volume
Mimics	↓	↓	AME, licorice ingestion, Liddle's syndrome

Question 13- Answer A- Abdominal Striae

Ptx with Cushing’s syndrome will usually present with abdominal striae, moon face, buffalo hump and weight loss in extremities. Ptx with Addison’s usually present with hyperpigmentation, central weight loss as well as hypotension.

Question 14- Answer A- Hypothalamo-pituitary-adrenal axis

The hypothalamus produces Corticotrophin-releasing hormone (CRH) that acts on the pituitary gland to produce Adrenocorticotrophic Hormone (ACTH) which acts on the adrenal glands to produce cortisol.

Question 15- Answer E- Water deprivation test with desmopressin

Large amounts of water is lost during DI. This is due to either a decrease in production of ADH (cranial cause) or an impaired response to ADH (nephrogenic cause).

Ix= deprive ptx of water, test osmolality pre and post giving desmopressin (ADH/Vasopressin)

Urine osmolality on deprivation	Urine osmolality after desmopressin	Diagnosis
<300	>800	Cranial
<300	<300	Nephrogenic

Question 16- Answer E- ≥ 48 mmol/mol

The values are determined by WHO. Patient also needs to have done a glucose tolerance test in order to confirm the diagnosis. In glucose tolerance test (GTT) of a suspected diabetic patient you would expect to find that fasting glucose levels to be above 7mmol/mol and 2hr GTT levels to be more than 11mmol/mol.

Full diagnostic criteria for DM is as follows:

- Fasting plasma glucose >7mmol/L
- HbA1c of ≥ 48 mmol/mol
- Symptoms and random plasma glucose >11mmol/L

Question 17- Answer A- Down’s syndrome

Down’s syndrome has no correlation with hypercalcaemia. When thinking of signs and symptoms of hypercalcaemia always remember bones, stones, groans and psychic moans. Causes of hypercalcaemia can be remembered by the mnemonic CHIMPANZEES- Calcium supplements, Hydrochlorothiazide, Iatrogenic/Immobilisation, Multiple myeloma/Medication (lithium), Parathyroid hyperplasia, Alcohol, Neoplasm, Zollinger ellison syndrome, Excessive Vit D, Excess Vit A, Sarcoidosis

Question 18- Answer C- Tall Tented T Waves

Hyperkalaemia ECG = absent P waves, prolong PR, tall T waves and wide QRS complex. Narrow QRS complex is seen in Atrial flutter and Junctional Tachycardia. U waves are seen in hypokalaemia not hyperkalaemia.

Question 19- Answer E- Pancreatogenic Diabetes

Diabetes can be secondary to pancreatic pathology such as pancreatitis or removal of pancreas. Removal of pancreas would mean insulin is not produced in the body thus the blood sugar levels would increase. Remember the causes of pancreatitis and the subsequent pathology that would happen from it. Addison’s and Conn’s both present with symptoms of thirst and polyuria but in this pts history there is nothing that suggests that this might be the diagnosis. Gilbert’s is an inherited condition that affects your liver.

Question 20- Answer A- Carcinoid syndrome

Carcinoid syndrome is paraneoplastic syndrome that has a classical triad of cardiac involvement, diarrhoea and flushing. Its due to the tumour cells producing 5-HT.

Gastrointestinal

Question 21-Answer C-Patches of transmural inflammation throughout large bowel and terminal ileum, with evidence of granulomas and deep ulceration.

Whilst Crohn's disease and Ulcerative colitis can seem very similar on examination, there are some key differences. In Steve's case, his previous flare a year ago showed some evidence of colitis (diarrhoea, tenesmus, blood in stool and excess mucus). However, with the current flare he is showing some signs of malabsorption and anaemia without visible blood in the stool (pallor, weight loss and angular cheilitis). Whilst there still maybe microscopic bleeding leaving blood in the stool that Steven may not notice, the lack of mucus in this current flare might indicate the inflammation is no longer in the large bowel.

A – continuous mucosal inflammation is a key sign of Ulcerative colitis. It also is limited to the large bowel, hence the abrupt stop at the ileocaecal junction. This appearance of Ulcerative colitis would be described as pancolitis.

B- again with the continuous mucosal inflammation this is another manifestation of Ulcerative colitis. However, this time it is limited to the rectum. This appearance would be described as proctitis.

C – there are a couple of indicators that this is more likely to be Crohn's disease. To begin with, there is transmural (full intestinal wall) inflammation, rather than being limited to the mucosa like in Ulcerative colitis. Secondly, rather than being continuous the inflammation is patchy (skip lesions), and the presence of granulomas also sets it apart from Ulcerative colitis.

D – again this is a different manifestation of Ulcerative colitis in a different location (rectum to descending colon). This would be described as left sided colitis.

E – This may seem like an unclear picture of which type of IBD this is. The diffuse nature of the inflammation is not classic of Crohn's disease, and the presence of granulomas is not classic of Ulcerative colitis. And in both Crohn's disease and ulcerative colitis you would expect to see some crypt architecture changes. Therefore, it is important to consider other causes of inflammation. In this case, this is a clinical picture of infectious colitis.

Question 22- Answer D-IgA tissue transglutaminase or IgA endomysial antibody

The most likely diagnosis for the vignette given is coeliac disease. Whilst all the blood tests would be sensible tests to order in this scenario, tTGA or EMA are specific for Coeliac disease.

It is important to note that the gold standard of diagnosis for coeliac disease is endoscopy and intestinal biopsy. Positive antibody tests are used for identifying those who are more likely to have Coeliac disease, and who therefore should be referred to gastroenterology for endoscopy and intestinal biopsy which is much more invasive.

A- the scenario is also similar to a clinical picture of IBD. Faecal Calprotectin is used to differentiate between IBS and IBD, and a positive result would also result in a referral to gastroenterology for further testing.

B – certain parasites (e.g. Giardia) and bacteria (e.g. Campylobacter) can cause chronic diarrhoea. An extensive travel history should be taken if this is suspected.

C – Coeliac disease and other GI conditions resulting in malabsorption can result in iron deficiency anaemia. Whilst this might not be a diagnostic test, it is important to check iron levels as well to see if this could be an underlying cause of fatigue.

E – CRP and ESR tests can indicate if inflammation is occurring somewhere in the body. Whilst these are useful in monitoring Coeliac disease, they are not enough to confirm a diagnosis by themselves.

Question 23-Answer A-Oesophageal Cancer

The pattern of worsening dysphagia from solid food to more soft food would indicate that the underlying issue was one of a growing mass. This is supported by the sudden weight loss and vomiting soon after food. Acid reflux is a risk factor of oesophageal cancer, along with smoking, excess alcohol, and obesity. The coughing indicates that the mass is located in the upper third of the oesophagus.

B = this presentation is not dissimilar to gastric cancer; however, the presenting complaint of worsening dysphagia makes it more likely to be oesophageal in origin.

C = again, this would present quite similarly. However, the presence of blood in the vomit, presence of risk factors and absence of gurgling in the neck on palpation and halitosis from decomposing food makes it less likely to be a pharyngeal pouch.

D = Crohn's disease can present in the upper GI tract. However, the symptoms differ with ulceration of the mouth and oesophagus, 'cobble stoning', swelling of the lips along with dysphagia from narrowing of the oesophagus. Oesophageal and oral Crohn's disease are much less common, therefore unlikely in this case.

E = Peptic ulcer symptoms are very similar to this case. However, again the key symptom that makes this more likely to be oesophageal cancer is the worsening dysphagia with soft foods.

Question 24-Answer E-Appendicitis

Acute Appendicitis classically presents itself with periumbilical pain which later concentrates in the right iliac fossa. Pain usually comes before any vomiting and nausea, and constipation rather than diarrhoea is more common even though diarrhoea may occur. Patients can present tachycardic with a raised temperature, guarding and with rebound tenderness – this could indicate peritonism. Pain in the right iliac fossa on palpation of the left is called Rovsing’s sign.

A = an ectopic pregnancy would also be a sensible assumption to make as the patient is in the right age range and is female. This is always something to have at the back of your mind with a female patient of child-bearing age coming in with acute abdominal pain. However, in this case with the overall clinical picture and the fact she is on the contraceptive pill would place appendicitis at a higher priority.

B= for cholecystitis you would expect pain to be in the right upper quadrant or epigastric rather than in the right iliac fossa. Pain may also spread to the right shoulder from irritation of the diaphragm and therefore the phrenic nerve.

C = for a UTI you would expect an increase in urinary frequency, as well as dysuria.

D = for Crohn’s disease, you would expect a more chronic presentation of diarrhoea.

Question 25- Answer B- Increasing exercise and altering fibre and fluid intake

In this case Sharon is showing signs of irritable bowel syndrome. Whilst this can present in a very similar way to IBD and coeliac disease, it is a functional problem with the intestines. This means that while there is nothing physically wrong with the intestines, they are not functioning properly. IBS is a very common disorder, and in this case, it can present with a mixed picture of both constipation and diarrhoea along with abdominal bloating and pain. A key risk factor is recent stress which can exacerbate episodes. It is important in order to diagnose IBS, to rule out other causes of chronic diarrhoea such as IBD, Coeliac disease and any infectious cause. First line of management for IBS is lifestyle management, for instance identifying foods that might trigger episodes, increasing exercise, and altering fibre and fluid intake depending on if constipation or diarrhoea is the primary concern. Pharmacotherapy and CBT may be required further down the line of management.

A = for Coeliac disease you wouldn’t expect to see periods of constipation. Patients might notice a link with dietary gluten, along with steatorrhea. You would also expect to see some other features such as fatigue and weight loss. However, without tests this should not be ruled out.

C = For an exacerbation of IBD again you would not expect to see periods of constipation. Like coeliac disease you would expect some weight loss and fatigue and depending on the location of the flare potentially excess mucus and blood in the stool. Again, without tests this should not be ruled out.

D = With an infectious cause you would expect to see other signs such as some blood in the stool, systemic features such as fever and a source of infection such as recent travel.

E = With a cause like colorectal cancer you would expect to see some more red flag features such as blood and mucus in the stool, fatigue, night sweats and weight loss

Question 26- Answer A- The distal oesophageal epithelium undergoing metaplasia from squamous to columnar

The case described indicates that the cause of Geoff's symptoms is gastric oesophageal reflux disease (GORD). Barrett's oesophagus occurs when the lining of the distal oesophagus is exposed to stomach acid on a recurrent basis in conditions such as GORD. Over time this causes the normally stratified squamous epithelial cells of the oesophagus to undergo metaplasia which changes them to columnar epithelial cells. This can increase risks of developing oesophageal adenocarcinoma.

B and C – wrong location in oesophagus and wrong transition of cells.

D – this is a description of a sliding hiatus hernia which can cause GORD

E – this is a description of a rolling hiatus hernia which can cause GORD

Question 27- Answer E- PPI + Amoxicillin + Clarithromycin/Metronidazole

H. pylori is one of the most common causes of peptic ulcers, with either a Carbon-13 urea breath test or a stool antigen test as the main methods of diagnosis. The PPI helps to reduce the amount of acid produced, and a combination of clarithromycin or metronidazole and amoxicillin is first line for treatment for 7 days.

A = Whilst Gaviscon might be useful for symptomatic relief of acid reflux, it does not treat an *H. pylori* infection.

B = whilst the PPI may help with the production of stomach acid, it will not eradicate *H. Pylori* when used alone.

C = H_2 blockers are very useful in reducing stomach acid production, however they will not treat the underlying *H. Pylori* infection

D = Whilst H_2 blockers are very useful in reducing stomach acid production, PPIs are more effective at reducing stomach acid production.

Question 28-Answer B-Parietal Cells

Parietal cells are located in the gastric pit in the lining of the stomach and secrete HCl and intrinsic factor. Proton pump inhibitors irreversibly block H^+/K^+ ATPase (aka the gastric proton pump) of parietal cells. This prevents H^+ from being pumped into the gastric lumen. As a result, the chlorine ions pumped into the gastric lumen by the chloride channel have nothing to combine with, therefore HCl secretion is reduced.

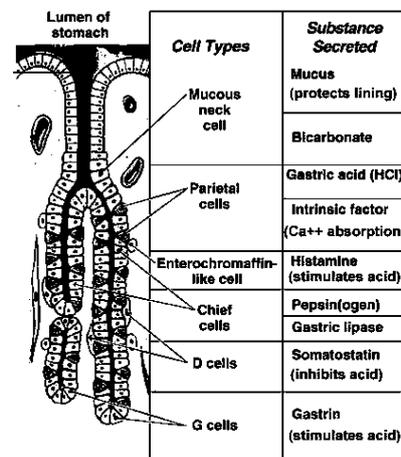
A = G cells secrete gastrin which stimulate gastric acid secretion.

C = Mucous neck cells secrete mucus and bicarbonate which work to protect the lining of the stomach.

D = Chief cells secrete pepsin(ogen) which works to break down protein, and gastric lipase which works to break down fat.

E = Enterochromaffin like cells (ECL cells) secrete histamine which stimulate gastric acid production.

The histamine works on parietal cells via H_2 receptors. This is the location of action of H_2 antagonists, which block the action of histamine therefore reducing acid secretion.



Genitourinary

Question 29- Answer C- Non-contrast CT kidney, ureter, bladder

This question is asking what the gold standard investigation is for a case of suspected renal colic. The gold standard investigation refers to the investigation that has the highest sensitivity for detecting an abnormality.

- A. *Ultrasounds are useful to identify if there is a stone, especially in pregnant women and younger recurrent "stone-formers" (since there is no radiation risk) but isn't the gold standard*
- B. *Contrast CT KUB isn't carried out to investigate renal colic and the use of contrast risks anaphylactic reactions*
- C. *Non-contrast CT KUB is the gold standard investigation for renal colic as it has the highest sensitivity. It also doesn't use contrast so there is no risk for anaphylactic reactions which is an added bonus*
- D. *Urine dipsticks can be useful to detect the presence of blood in the urine but doesn't confirm a diagnosis of renal colic*
- E. *X-ray KUB is the first line investigation to undertake but it doesn't have the highest sensitivity*

Question 30- Answer B- Calcium Oxalate

- A. *Ammonium Phosphate (struvite) formation occurs in renal colic caused by proteus, klebsiella and pseudomonas bacterial infections causing ammonia build-up in the urine*
- B. *Calcium Oxalate is the most common stone formation occurring in ~70-80% of cases as calcium and oxalate are natural chemicals found in lots of foods*
- C. *Calcium phosphate is the second most common stone formation occurring in ~15% of cases*
- D. *Cystine stones are rare and tend to occur in people who have rare genetic disorders that cause cystine to leak from the kidneys into the urine*
- E. *Uric acid form when the urine becomes too acidic which can occur due to a high purine diet, gout, obese individuals and diabetics*

Question 31- Answer A- Bladder Cancer

Painless haematuria is a strong suggestion of bladder cancer especially with changes to their bladder habits. The patient is a painter also suggests this as exposure to azo dyes is a risk factor

Question 32- Answer A- Haematuria

Whilst it is possible to experience haematuria with BPH this is not a typical symptom. Lower urinary tract symptoms associated with BPH can be categorised as storage symptoms (FUN) and voiding symptoms (SHIPP)

Storage (FUN)

- *Frequency – going more often*
- *Urgency and urgency incontinence – sudden compelling urge to void which is difficult to defer e.g. key in front door (latchkey incontinence)*
- *Nocturia – waking up in the night to void (more than normal)*

Voiding (SHIPP)

- *Straining – having to force it*
- *Hesitancy – having to wait before it starts*
- *Incomplete emptying – feeling that your bladder isn't empty*
- *Poor/intermittent stream – stream stops and start, poor flow*
- *Post-micturition dribbling – small amount of urine in urethra that leaks out after voiding*

Question 33- Answer D- Postural Hypotension

Tamsulosin is a selective alpha 1-adrenergic receptor antagonist which relaxes the smooth muscle in the bladder neck and prostate, allowing an increase in urinary flow rate and an improvement in obstructive symptoms. However, alpha 1 adrenoceptors are also found in smooth muscle of blood vessels and therefore alpha blockers can also lower vascular resistance resulting in postural hypotension, dizziness and syncope.

Question 34- Answer E- Streptococcus pneumoniae

An easy way to remember the common causes of UTIs is KEEPS

- *Klebsiella*
- *E. Coli – most common*
- *Enterococcus*
- *Proteus/pseudomonas*
- *Staphylococcus saprophyticus*

Question 35- Answer C- Hypoalbuminaemia, peripheral oedema, proteinuria

Minimal change disease is a type of nephrotic syndrome, defined by the following features:

- *Proteinuria (>3.5g/day) – damaged glomerulus more permeable → more protein come across from blood into nephron → proteinuria*
- *Hypoalbuminaemia – albumin leaves blood*
- *Oedema (periorbital and arms) – oncotic pressure falls due to less protein in blood → lower osmotic pressure → water driven out of vessels into tissues*
- *Hyperlipidaemia and lipiduria – loss of protein = less lipid synthesis → more lipids in blood → more in urine*

Question 36- Answer C- Potassium

When a patient with an AKI's kidney function start failing, they are unable to excrete potassium. When this happens, it causes a build-up in the blood and leads to hyperkalaemia which is a medical emergency as it can result in a cardiac arrest

Question 37- Answer B- Stage 2

Stage 1 > 90 ml/min with evidence of renal damage
Stage 2 60-89 ml/min with evidence of renal damage
Stage 3a 45-59 ml/min with or without renal damage
Stage 3b 30-44 ml/min with or without renal damage
Stage 4 15-29 ml/min with or without renal damage
Stage 5 <15 ml/min, established renal failure

Question 38- Answer A- Loop diuretic acting on ascending limb of loop of Henle

- A. Furosemide is a loop diuretic which acts on the ascending limb of the loop of Henle and inhibits the NKCC2 channels
- B. Loop diuretics typically affect ion transport in the ascending limb of the loop of Henle
- C. Furosemide is not a potassium sparing diuretic and they typically act on the distal convoluted tubule e.g. amiloride and spironolactone
- D. Furosemide is not a potassium sparing diuretic e.g. amiloride and spironolactone
- E. Furosemide is not a thiazide. Bendroflumethiazide is a thiazide which acts on the sodium/chloride transporters and prevents them from functioning properly

Drug class	Examples	Mechanism	Adverse effects/contraindications
Loop diuretics	Furosemide Bumetanide	Act on the ascending limb of the loop of Henle where they inhibit the Na ⁺ /K ⁺ /2Cl ⁻ cotransporter that transports the ions into the cell and water follows. Potent diuretic.	Dehydration, hypotension and hypokalaemia. Metabolic alkalosis can occur. In high doses can cause ototoxicity
K ⁺ -sparing	Amiloride Spironolactone	Acts on the distal convoluted tubules in the kidney, inhibits the reabsorption of sodium and therefore water by epithelial sodium channels leading to sodium and water excretion, and potassium retention	GI upset Hyperkalaemia Metabolic acidosis Gynecomastia
Thiazide	Bendroflumethiazide	Acts on the sodium / chloride transported and prevents it from functioning properly. Thus sodium is not retained. Longer acting than loop diuretics, but not as effective	Hypokalaemia Metabolic alkalosis Hypovolemia Hyponatremia Hyperglycaemia in diabetics

Haematology**Question 39- Answer A- Hodgkin's lymphoma**

Hodgkin's lymphoma has a bimodal presentation in the twenties and the sixties. It presents with a painless asymmetrical presentation but there is pain when drinking alcohol.

B) Multiple myeloma tends to present in those aged 70 and above. It presents with:

- Anaemia, neutropenia, thrombocytopenia due to bone marrow infiltration
- Recurrent infection due to monoclonal Igs
- Renal impairment due to the free light chains
- Bone pain, pathological fractures and vertebral collapse due to bone lesions (increases calcium and II-6)

C) Non-Hodgkin's lymphoma is incorrect because this tends to present in the elderly and has a symmetrical presentation.

D) Polycythaemia Ruba Vera presents with symptoms that are related to blood hyper viscosity due to an increase in cellular content. This leads to "thicker" blood and thrombosis meaning that there is poor oxygen delivery. Symptoms relate to this include headache, dizziness, visual disturbances, vertigo, tinnitus and intermittent claudication.

E) Stomach cancer can present with Virchow's node, a supraclavicular lymph node. However, there would be more signs of GI upset such as nausea, vomiting, heartburn, indigestion.

Question 40- Answer D- Philadelphia Chromosome

CML is a proliferation of the myeloid cells which are the eosinophils, basophils and neutrophils.

- A) Auer rods found in acute myeloid lymphoma
- B) CML causes an increase in basophils not decrease
- C) CML causes a decrease in haemoglobin and platelets due to the replacement of normal bone marrow cells with cancerous one.
- E) Reed-Steinburg cells are found in Hodgkin's lymphoma

Question 41- Answer C- 3

The Ann Arbor Classification is used for both Hodgkin's and Non-Hodgkin's Lymphoma.

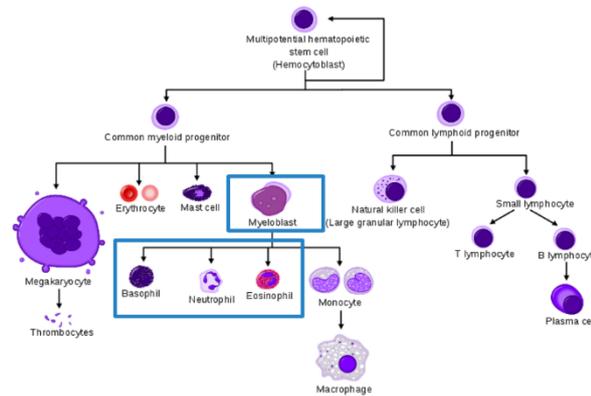
- 1. Single LN region
- 2. >/= 2 nodal area on the same side of the diaphragm
- 3. Nodes on both sides of the diaphragm
- 4. Disseminate e.g. metastasised to the liver
'B symptoms' are constitutional symptoms such as fever, weight loss and night sweats

Question 42- Answer C- Chronic myeloid leukaemia

Test results show the haemoglobin is slightly low, the platelets are very high and the white cell count is very high.

In CML- WCC will be very high and the haemoglobin and platelets can be higher or lower. This is because there is an increase in cell turnover of myeloblast cells which further differentiate into basophils, neutrophils and eosinophils. Leucocytosis is an increase in WBCs in the blood stream which occurs due to the abnormal proliferation of WBCs in CML.

In myeloma (E) you would expect to find monoclonal antibodies and Bence-Jones proteins.



Question 43- Answer D- Nausea

Risk factors for DVT are based upon Virchow's triad: stasis of blood flow, hypercoagulability and vessel wall injury. Examples include immobility e.g. hospital bed/long haul flight, dehydration, oestrogen e.g. pregnancy, genetic clotting disorders e.g. lack of protein C, obesity e.g. atherosclerosis, age (the older you are), varicose veins, surgery, previous DVT, trauma, infection and malignancy. Note that Well's score is used to calculate the likelihood that someone has had a DVT.

Question 44- Answer C- Doppler USS

Doppler US scan is the gold standard for DVT.

- A) E) CT scan and XR are not used for investigating DVT.
- B) D-dimer is carried out in someone with a suspected DVT however it has a high sensitivity and a low specificity which means that if negative it rules out a DVT but if positive it does not mean that the patient definitely has a DVT.
- D) Venography used to be gold standard but it is now Doppler US scan.

Question 45- Answer D- Reduced reflexes

Reduced reflexes are a feature of macrocytic anaemia caused by hypothyroidism (note- reduced/absent reflexes also seen in vit B12 deficiency macrocytic anaemia).

Pale skin and conjunctivae are typical signs in anaemia as is a systolic flow murmur.

Brittle or spoon shaped (koilonychia) and brittle hair are signs of iron-deficiency anaemia

Question 46- Answer E- Vitamin B12 deficient anaemia

Vitamin B12 anaemia is caused by a lack of vitamin B12 in the diet. Vitamin B12 is found in fish, meat, poultry, eggs and is not generally present in plant-based foods therefore a vegan diet which excludes these food products may make someone more likely to be vitamin B12 deficient. Another cause is impaired absorption.

Vitamin B12 is absorbed at the terminal ileum with the help of intrinsic factor (produced by the stomach), therefore disease of the terminal ileum is more likely to result in VitB12 Deficiency. Vitamin B12 deficiency anaemia also present with neurological symptoms such as peripheral neuropathy making it the most likely answer. The main causes of megaloblastic anaemia are vitamin B12 deficiency or folate deficiency, but folate deficiency does not present with neurological symptoms.

Question 47- Answer E- Presence of dark urine

With haemolysis there is an increase in the destruction of RBCs. As a result, the bone marrow tries to increase the production of RBCs through the process of erythropoiesis which means that an increased reticulocyte will be seen (A). Due to the increased destruction of the RBCs, haemoglobin is released which increases bilirubin levels. The bilirubin is conjugated in the liver and when the liver is having a hard time keeping up with the amount of bilirubin it means that urine will be darker because the extra bilirubin is excreted in the kidneys. Albumin is not affected by haemolysis (B).

Question 48- Answer E- Sickle Cell Disease

Answers A-D are all causes of iron deficient anaemia. Sickle cell disease is a cause of microcytic anaemia. Iron deficient anaemia is also microcytic anaemia but sickle cell disease is not caused by iron deficiency.

ICS- Pathology

Question 49- Answer B- Action of the drug on the body

- A. Action of the body on the drug= pharmacokinetics
- B. Action of drug on body= pharmacodynamics ('D'yamics= 'D'rug)
- C. Hepatic metabolism
- D. Renal metabolism
- E. Adverse effects.

Question 50- Answer A- Action of the body on the drug

See question above for explanation of definitions.

Question 51- Answer E- Yellowing of nails

Amitriptyline has significant anticholinergic properties. The anticholinergic properties decrease the effect of the parasympathetic nervous system and give characteristic symptoms as above: blurred vision, confusion, dry mouth, urinary retention. It is worth memorising a few of these symptoms as it is the same side effect profile for many drugs. A cause of yellowing nails is nicotine.

Question 52- Answer A- Inhibits bacterial cell wall synthesis

- A. *Inhibits bacterial cell wall synthesis, other abx that inhibit cell wall synthesis are glycopeptides (vancomycin, teicoplanin), cephalosporins (cephalexin, cefuroxime), carbapenems (imipenem)*
- B. *Inhibitor of phosphodiesterase type 5 – this is the action of sildenafil*
- C. *Inhibits protein synthesis by bacteria – this is the action of macrolides (clarithromycin, erythromycin), tetracyclines (tetracycline, doxycycline) and aminoglycosides (gentamicin)*
- D. *Inhibits the action of COX – this is the theorised action of paracetamol*
- E. *Interferes with bacterial DNA replication and transcription – this is the action of quinolones (ciprofloxacin)*

Question 53- Answer E- Spinach

Warfarin is a vitamin K antagonist. Vitamin K is required for the synthesis of clotting factors 2, 7, 9 and 10 – therefore antagonism of vitamin K decreases the production of these clotting factors making the blood thinner and increasing the INR. Spinach is high in vitamin K so an increase of vitamin K may decrease the effect of warfarin. Grapefruit, cranberries and alcohol increase warfarin's effect and should be avoided. Remember high INR= haemorrhage (H-H), low INR= clotting (lo-lot)

Question 54- Answer C- Co-amoxiclav

Co-amoxiclav is a combination of amoxicillin and clavulanic acid. Given the allergy to penicillin this is CI for this patient- remember to always ask patients for allergies.

Question 55- Answer B- Methadone

Methadone is the licensed treatment – it is prescribed by community drug teams or GPs with further training.

Diclofenac (A) is an NSAID and Metformin (B) is used in the treatment of diabetes mellitus.

Oxycodone (D) and Tramadol (E) are both medications that can be misused.

Question 56- Answer C- Prescribing antibiotics in viral infections at appropriate doses

Antibiotics should not be prescribed in a viral infection unless a bacterial co-infection is suspected.

See more: <https://infectionsinsurgery.org/core-elements-of-antibiotic-stewardship>

Question 57- Answer E- Phenoxybenzamine

Phaeochromocytoma is a tumour of the adrenal medulla, specifically chromaffin cells, which cause increased release of catecholamines (mainly adrenaline). This causes symptoms of episodic palpitations, headaches and hypertension and requires surgery. During the removal of the tumour it is possible for a large amount of catecholamine release to occur – causing refractory hypertension.

Therefore, by pre-blocking the alpha receptors with phenoxybenzamine you prevent this happening.

You do not use beta blockers (A) because blocking B2 mediated vasodilatation could cause

uncontrolled A1 mediated vasoconstriction, again causing severe, refractory hypertension. However once alpha blockade is achieved, you may also add beta blockers prior to surgery.

Atorvastatin (B) is used in the management of hypercholesterolaemia, Carbimazole (C) is used in thyrotoxicosis and Insulin (D) is used in the management of diabetes.

Microbiology

Question 58 – Answer E - Pseudomembranous colitis

(A) *C. diff* tends to colonize the large intestine, and so is unlikely to get near the duodenum and common bile duct; (B) Diverticulitis is due to colonisation of diverticulae by enteric bacteria such as *E. coli*; (C) Ischaemic colitis is associated with a history of atrial fibrillation – no microbiology involved!; (D): Peptic ulcer is associated with *H. pylori* infection (E) Pseudomembranous colitis is correct – *C. diff* toxin causes local inflammation of the large intestine → significant diarrhoea.

Question 59- Answer B- Coffee-ground vomitus

All symptoms but B may present in severe gastroenteritis. Coffee-ground vomit indicates bleeding in the upper GIT – the blood mixes with gastric acid and oxidises, so looks like black spots in the vomitus. Gastroenteritis does irritate the stomach, but not to the extent of causing significant bleeding. You would definitely expect vomiting in gastroenteritis, but it shouldn't be associated with an upper GI bleed.

NB: Note that reduced skin turgor indicates that the patient is moderately dehydrated, but in very severe cases the patients may become shocked, with fluid loss leading to hypovolaemia and a massive hypotension. Management of diarrhoea should always involve adequate hydration!

Question 60- Answer D- Mycobacterium avium complex

A: Atypical pneumonia contracted from infected birds – patient often owns a parrot; B: Atypical pneumonia also called 'Q fever' associated with contact with animals; C: Atypical pneumonia also called Legionnaire's disease – pneumonia + hyponatraemia (low serum sodium) – typical exam history involves a patient who has stayed in a hotel with shoddy air conditioning or a standing water reservoir; D: MAC causes mycobacterium avium-intracellular infection, an AIDS-defining illness that can present in patients with a CD4 count below 50 cells/ μ L – it presents similarly to pulmonary TB; E: Atypical pneumonia that also presents with neurological symptoms, autoimmune haemolytic anaemia and a rash called erythema multiforme

Question 61- Answer A- Erythromycin

Remember RIPE + some important SEs of each drug:

Rifampicin: Red/orange discolouration of secretions e.g. urine + tears; Isoniazid: Peripheral neuropathy; Pyrazinamide: High uric acid levels → gout; Ethambutol: Colour blindness + reduced visual acuity (EYE-thambutol)

Question 62- Answer A- Ampicillin

A: Penicillin indicated in UTI, respiratory infections and enterococcal infections (endocarditis, wound infection, intra-abdominal infection); B: 3rd generation cephalosporin used in severe infection, most notably suspected bacterial meningitis; C: Macrolide indicated in Staph infections, strep throat and atypical pneumonias; D: Penicillin indicated in Staph aureus and Group A Strep e.g. cellulitis + necrotizing fasciitis; E: Glycopeptide antibiotic used in MRSA infection

Question 63- Answer D- Tricuspid

The tricuspid valve is the first heart valve to be encountered after blood has returned from the systemic circulation, so bacterial seeding is most common here – the tricuspid is the primary effected valve in ~50% of patients, with the mitral and aortic being less common (both at ~20%), although there is often a mixed picture. Pulmonary valve endocarditis is rare. Coronary valve isn't a thing.

NB: Highest risk group is IV drug users; if you see an IVDU in an exam, think of infective endocarditis or iliopsoas abscess

Question 64- Answer D- Neisseria spp.

A: Gram +ve cocci in pairs/chains; **B:** Gram -ve bacilli (grows on MacConkey); **C:** Waxy coating makes gram classification difficult – requires acid-fast staining such as the Ziehl-Neelsen stain; **D:** *Neisseria meningitidis* is the classic gram -ve diplococcus in exams!; **E:** Gram +ve, catalase +ve, coagulase +ve cocci that form in clusters

Question 65- Answer C- Erythromycin

C is correct – Macrolide abx such as clarithromycin and erythromycin inhibit protein synthesis. Beta lactam abx, including penicillins (BenPen) and cephalosporins (Cefotaxime), and Glycopeptide abx (Vancomycin, teicoplanin) all inhibit cell wall synthesis.

Question 66- Answer E- Streptococcus pneumoniae

A: *H. influenzae* is the second most common cause, associated with approx. 20% of cases; **B:** *Moraxella* is associated with immunocompromised patients; **C:** *Pseudomonas* is a common cause of pneumonia in patients with cystic fibrosis and bronchiectasis; **D:** *S. aureus* can cause pneumonia in patients with chronic pulmonary conditions; **E:** *S. pneumoniae* is the causative organism in approx. 50% of cases.

Question 67- Answer C- Respiratory rate: 28/min

Explanation: **CURB-65** criteria – score 1 for each of: **C**onfusion; **U**rea > 7mmol/L; **R**esp rate >30/min; **B**lood pressure (Sys <90mmHg, Dia <60mmHg); **A**ge >65.

Score 0-1: Treat as outpatient; score 2: Admit to hospital; score ≥3: Severe, may require step up to ITU.

Musculoskeletal

Question 68 - Answer A -Bouchard

All of the answers B-D are common deformities seen in rheumatoid arthritis. Bouchard nodules are found proximally on the fingers seen in Osteoarthritis.

Question 69- Answer E- Rhomboid shape and positively bi-fringent

This the correct answer for pseudo-gout. A useful way to remember that it's positive is that P for Positive and P for pseudo-gout. If the patient had gout the answer would be needle shaped and negative bi-fringent. To remember this one more easily just think the TWO N's need to be together.

Question 70-Answer E-Denosumab

First line treatment for osteoporosis is Alendronic acid (oral bisphosphonate) and AdCal (vit D and calcium supplement). Second line: is the introduction of Denosumab (monoclonal antibody to RANK ligand). This inhibits osteoclast activity and bone resorption

Question 71- Answer C- Inhibit bone resorption through the inhibition of enzyme (Farnesyl Pyrophosphate synthase) which reduces osteoclast activity

(A) describes how recombinant PTH works (i.e. Teriparatide) this is used as a last line treatment for patients still suffering from fractures with the other medications. (B) is made up. (C) is the correct answer for bisphosphonates- inhibiting bone resorption by reducing osteoclast activity. (D) is wrong as increasing osteoclast activity would increase bone resorption not decrease it. (E) is how Denosumab (second line treatment) for osteoporosis works- as a monoclonal antibody for RANK ligand inhibiting osteoclast activity.

Question 72- Answer B- Colchicine

Colchicine (B) helps to reduce inflammatory responses such as acute gout. Diclofenac (C) is no longer prescribed as a NSAID due to its CI and SE. Allopurinol (A) and Febuxostat (B) are preventative gout drugs. Allopurinol should not be given in acute flare up as this can further exacerbate the joint. IV antibiotics (E) are not appropriate in this case as there is no infection.

Tip to remember: aCute= aColchicine. Long term= allopuri-long (allopurinol)

Question 73- Answer C- Osteoarthritis

With degenerative joint disease you get joint stiffness that worsens with wear and as such worsens during the day. Inflammatory/AI causes of joint pain tend to have joint stiffness that improves over the course of the day with use e.g Rheumatoid Arthritis / Ankylosing spondylitis.

Question 74- Answer A- Anti-citrullinated peptide antibody (anti-CCP)

Anti- CCP is the most specific investigation for RA. RF and CRP are not specific enough for a diagnosis of rheumatoid arthritis. X-Rays are useful for staging the disease. MRI would be inappropriate in this case.

Question 75- Answer E-Reduced joint space, osteophytes, subchondral sclerosis, subchondral cysts

Osteoarthritis has a specific appearance on X-Ray. Mnemonic LOSS: Loss of joint space, osteophytes, subchondral sclerosis and subchondral cysts. A and D are seen in Rheumatoid arthritis. B and C are incorrect as you always get loss of joint space

Question 76- Answer B- Aspirate the joint and send blood cultures

This patient has septic arthritis. It is crucial to start treatment fast. To determine the causative organism of the infection. You need to aspirate the joint and send off a blood culture. After this you immediately start antibiotic treatment.

Question 77- Answer D- Physiotherapy and NSAIDS

The patient has ankylosing spondylitis- clues that it is a young person, morning stiffness, raised inflammatory markers. First line management is NSAIDS and physiotherapy (D). Steroid injections (E) could be used in future for more targeted pain relief. Likewise, you should also never use bed rest- this will make the condition worse as ankylosing spondylosis symptoms get better with exercise.

Neurology

Question 78- Answer E- Rupture of middle meningeal artery

- A. Depending on where the clot is located will cause different effects but would not appear as a haematoma on a CT.
- B. Cause of a stroke and would not present with these symptoms or a haematoma on a CT head.
- C. Subarachnoid haemorrhage which appears 'star-shaped' on a CT scan and follows a spontaneous rupture of berry aneurysm not following a head injury
- D. Subdural haemorrhage which appears 'sickle/crescent shaped' on a CT scan and there is no lucid period.
- E. A lemon shaped bleed and a lucid period following a head injury in the brain is characteristic of an extradural haemorrhage which is caused by a rupture of the middle meningeal artery

Question 79- Answer C- Ibuprofen

History is suggestive of a migraine.

- A. Amitriptyline – prophylactic 3rd line treatment of a migraine
- B. Aspirin – used to treat tension-type headaches
- C. Ibuprofen belongs to the drug class NSAIDs, which is the 1st line treatment for a migraine
- D. Topiramate – is the first line prophylactic treatment of a migraine
- E. Withdrawal – only useful for drug-overuse headache if the patient has a history of regular (>3 month) use of drugs such as triptans, opioids, NSAIDs etc.

Question 80- Answer C- Pseudomonas aeruginosa

- A. *Listeria monocytogenes* – pregnant women are at high risk of this cause of meningitis
- B. *Neisseria meningitis* – worse prognosis of meningitis
- C. *Pseudomonas aeruginosa* – most common cause of infection following admission to hospital for greater than .1 week.
- D. *Streptococcus agalactiae* – cause of meningitis in neonates
- E. *Streptococcus pneumoniae* – most common cause of meningitis

Question 81- Answer C- Median Nerve

- A. Axillary nerve – in the armpit
- B. Brachial nerve – not a real thing! The brachial plexus is a network of nerves located further up the arm.
- C. Median nerve – Classical presentation of carpal tunnel syndrome- involves median nerve.
- D. Radial nerve – splits into deep and superficial branches at the cubital fossa to supply the forearm and hand
- E. Ulnar nerve – medial to the ulnar artery and enters the hand via the ulnar canal.

Question 82- Answer D- Multiple Sclerosis

- A. *Creutzfeldt-Jakob disease – very rare and usually affects people 55+. Can cause muscle weakness but not any of the rest of the symptoms.*
- B. *Duchenne Muscular Dystrophy – only affects males – X-linked recessive*
- C. *Motor Neurone disease – depending on where the lesion is this will present with different symptoms. The patient will suffer mainly with motor weakness, but the rest of ‘everything up’ or ‘everything down’ trends of symptoms don’t occur here, and the rest of the presentation does not fit the criteria for MND either.*
- D. *Multiple Sclerosis – MS is a chronic autoimmune demyelination of the CNS. This means that many symptoms can occur depending on the lesion in the CNS. Uhthoff’s phenomenon (symptoms getting worse with heat) is very characteristic of MS, and the patient usually suffers attacks for a period of days -> weeks before remaining symptom free for a short period of time. The symptom free period decreases as the disease progresses. Learn the DEMYELINATION acronym for a good way to remember many of the ways MS can present.*
- E. *Myasthenia Gravis – presents with muscle fatigue, but not many of the other symptoms. It has a characteristic order in which affects the muscle groups: extraocular, bulbar face, neck, limb girdle and then trunk.*

Question 83- Answer B- Fasciculations

- A. *Babinski reflex - the Babinski reflex (when you stroke the bottom of the foot and the toes curl) **should not** be present in adults. A positive Babinski response indicates an underlying nervous system problem and can be a sign of UMN disease*
- B. *Fasciculations – a sign of lower motor neurone lesions.*
- C. *Increased muscle tone – in UMN everything goes UP = increased muscle tone. There is decreased muscle tone in LMN disease.*
- D. *Muscle weakness – present in both UMN and LMN disease*
- E. *Overactive reflexes - in UMN everything goes UP = increased reflexes. There is a decreased reflex response in LMN disease.*

Question 84- Answer D- Risperidone

- A. *Gabapentin – used to treat seizures and neuropathic pain. Commonly used in epilepsy.*
- B. *Haloperidol – used to treat psychosis in Huntington’s*
- C. *Prednisolone – steroid treatment used in AI / inflammatory condition*
- D. *Risperidone – dopamine receptor antagonist that helps to manage aggression and chorea. Belongs to the antipsychotic drug class*
- E. *Sertraline – SSRI used to treat depression*

Question 85- Answer C- IV immunoglobulins

- A. *Low dose aspirin – treatment for many things; but not GBS.*
- B. *Dexamethasone – treats inflammation, cerebral oedema, palliative care and other conditions.*
- C. *IV immunoglobulin – contains antibodies. Given to help prevent harmful antibodies damage your nerves*
- D. *SC Sumatriptan – treatment for cluster headaches*
- E. *Pyridostigmine – treatment for myasthenia gravis*

Question 86- Answer D- Dehydration

Depression, lack of sleep, missed meals and stress are all known causes of tension headaches. Dehydration is not. Note that a ‘dehydration headache’ is not the same as a tension headache.

Question 87- Viral PCR

- A. Blood culture – can be used to help with diagnosis but is not the best way to reach a diagnosis
- B. CT head – will not help diagnose
- C. Immunofluorescence – can be used to help diagnose but isn't as useful as PCR
- D. Lumbar puncture – used to help diagnose encephalitis and meningitis
- E. Viral PCR – can be used to detect VZV DNA very quickly to reach a diagnosis.

Respiratory

Question 88- Answer C- Clubbing of the fingers

The correct answer is c. Clubbing is found in some respiratory conditions such as lung cancer, pulmonary fibrosis and bronchiectasis, but not in asthma. The other options are all suggestive of asthma.

Question 89- Answer C- pneumocystis jirovecii

Pneumocystis Jiroveci (C) is a fungus, associated with immunocompromised individuals and is an AIDS defining condition, hence any patient with a presentation of pneumonia should be given a HIV test. Strep Pneumonia is the commonest cause of pneumonia accounting for 50% of cases. Haemophilus Influenzae (A) is also a very common cause accounting for 20% of cases. Pseudomonas Aeruginosa (D) is commonly associated as a cause in people with bronchiectasis or cystic fibrosis. Legionella Pneumophila (B) is an atypical cause (Atypical meaning cannot be cultured in the normal way and don't respond to penicillins). It is associated with infected water supplies and air conditioners, it can cause SIADH and therefore hyponatraemia may be a finding on U&Es.

Question 90- Answer C- Start a DOAC such as apixaban

BNF 2020 guidance for treating a confirmed pulmonary embolism is to start the patient on a DOAC such as apixaban or rivaroxaban, if this is unsuitable or contraindicated then you can start them on LMWH such as dalteparin. <https://bnf.nice.org.uk/treatment-summary/venous-thromboembolism.html> Note than when calculating Wells scores there is a different one for DVT and for PE, make sure you use the right one. Try use this PE calculator to get the correct Wells score of 7- <https://www.mdcalc.com/wells-criteria-pulmonary-embolism> (A) Thrombolysis is reserved for massive PE, with haemodynamic compromise. The patient above is quite stable and therefore this is not indicated (a systolic of <90mmHg is indicative of massive PE, massive PE has a high mortality rate).

(B) A Dimer is not indicated here as the likelihood of a PE and/or DVT is high. Additionally, the patient has a known malignancy and therefore the D-dimer would be raised regardless (other causes of a raised D-dimer include pneumonia, surgery, pregnancy and heart failure).

(D) CTPA is the diagnostic investigation for PE however the question states that radiology have already confirmed the likely diagnosis, so we assume this has already been done, repeating the CTPA would be of no clinical benefit.,

(E) Warfarin is often used as long-term anticoagulation, although compared to DOACs it has a narrow therapeutic index and requires frequent monitoring so there is a shift to using DOACs instead. Wells score (for PE) calculator-

Question 91- Answer B- Isoniazid

- A. Rifampicin can present with red/orange discolouration of urine (R=Red)
- B. Isoniazid with peripheral neuropathy, (Per-isoniazid- neuropathy)
- C. Pyrazinamide with hyperuricaemia causing gout (Hy-pyraz-uracaemia)
- D. Ethambutol affecting the eyes (colour blindness and visual acuity). (E=Eyes)
- E. Pyridoxine (B6) is what you would give to prevent the peripheral neuropathy caused by isoniazid.

Question 92- Answer B- immediate decompression via large bore canula

This gentleman has presented with a classic primary spontaneous pneumothorax, which has developed into a tension pneumothorax (a medical emergency, due to the fact it can cause cardiorespiratory arrest). The answer is therefore B) immediate decompression via large bore canula. The other answers are possible treatments depending on the severity and size of the pneumothorax. The British Thoracic Society provide good guidance, but here is an abridged version

- A. No treatment is needed if there is no SOB and the pneumothorax is <2cm in size
- B. See above
- C. A chest drain is often used if the patient is unstable, has secondary pneumothoraces, or needle aspiration fails twice
- D. May be done if only mildly symptomatic and otherwise stable. Leaves room for further treatment
- E. Often used as a first measure for primary spontaneous pneumothorax but not tension

The general signs of tension pneumothorax include hypotension, tachycardia, increased resonance to percussion on affected side, reduced air entry on affected side, and tracheal deviation AWAY from the side of the pneumothorax.

A primary pneumothorax refers to an unprovoked event. A secondary implies a trigger such as lung pathology, trauma, or medical interventions.

Question 93- Answer D- Respiratory acidosis with partial metabolic compensation

How to approach ABGs:

- Look at pH. If it is >7.45= alkalosis. If it is <7.35= acidotic.
- Look at CO₂. If the CO₂ goes in the same direction as the pH it is metabolic, if it goes in the opposite direction it is respiratory. (Tip to remember= 2 people who travel in the same direction are likely to 'meet'= 'met').

Although the bicarbonate is elevated, the pH has remained low. If the pH had corrected itself, it would be a respiratory acidosis with full metabolic compensation (E). It takes a couple of days for the kidneys to correct the pH, and so we know from this that this patient has had a respiratory acidosis for at least a few days. Opiates, GBS, and obstructive lung disease (asthma and COPD) can cause respiratory acidosis. Recommended resource for ABGs- <https://geekymedics.com/abg-interpretation/>

Question 94- Answer D- Long-acting muscarinic antagonists

The key word here is muscarinic, relating to acetylcholine receptor (also just known as muscarinic receptors) and the parasympathetic nervous pathway.

Short acting beta-adrenergic receptor agonists (SABA) also causes smooth muscle relaxation but acts on beta₂-receptors (E). Corticosteroids do the same, but via different receptors and modifying the transcription of some genes (B). Leukotriene receptor antagonists (LTRA) work in a different manner (wouldn't worry too much about this). I would remember montelukast. These are commonly used later in the asthma management ladder (C). H₁ receptor antagonists (antihistamines) include fexofenadine (used for hayfever and urticaria, as well as pruritus) and chlorphenamine (often used in anaphylactic reactions) (A).

Question 95- Answer C- Confusion, Urea, Respiration Rate, Blood Pressure, Age 65

C is the correct answer. Each one gives a single point. Urea > 7, Respiration ≥ 30, Blood Pressure < 90 systolic, or ≤60 systolic, and age 65 or above. It is worth learning as they do like giving you a history and asking you to work out the score (Glasgow Coma Scale is another example of this).

0/1: consider treatment at home

≥ 2: consider hospital treatment

≥3: consider intensive care assessment.

A fever is a classic symptom of pneumonia. Haemoptysis is also a possible symptom. It is always worth asking and thinking about underlying medical conditions, such as COPD, HIV, CKD and asthma, which would decrease your threshold to admit. There are also atypical pathogens associated with some of these diseases, which are worth looking at.

Question 96- Answer B- Hypercalcaemia

Hypercalcaemia (B) is a key finding in the diagnosis of sarcoidosis. These types of questions are common – giving you a history and asking you to form a diagnosis and then answer a follow up question. In this case, the CT findings, age, and the rash (erythema nodosum) gives a strong suggestion of sarcoidosis. Hyperkalaemia (A) has many causes; it is worth looking into this as it can be a medical emergency due to the effects it can have upon the heart. Hyponatremia (C) can be caused by small cell lung cancer due to ectopic ADH secretion, causing SIADH. Hypocalcaemia (D) has many causes, including CKD, hypoparathyroidism and pancreatitis. Hypokalaemia (E) is commonly associated with heavy GI loss such as severe diarrhoea, vomiting, laxative use. Burns and drugs (steroids, diuretics, and beta-2-agonists) are other causes.

Question 97- Answer E- Anti-glomerular basement membrane

Goodpasture's disease attacks both the glomerulus and the pulmonary basement membranes, therefore giving a clinical picture of an AKI and haemoptysis. D) Anti CCP are associated with rheumatoid arthritis. Although mainly affecting the joints, it is worth remembering rheumatoid disease has many extra articular manifestations, such as pulmonary fibrosis, bronchiolitis obliterans and pleural effusions (as well as many other systems). Anti-smooth is mostly associated with autoimmune hepatitis, and primary biliary cirrhosis. Anti-TPO is present in autoimmune thyroid disease.

Public Health

Question 98- Answer B- HIV

B is correct! HIV is a notifiable disease in some countries, but it is not currently and indeed has never been a notifiable disease in the UK. However, it is worth remembering that contact tracing and partner notification are still important in the management of HIV! The others are all notifiable disease. <https://www.gov.uk/guidance/notifiable-diseases-and-causative-organisms-how-to-report> A good website to visit to see the list of notifiable disease and organisms and how and when to report them

Question 99- Answer E- 16

Calculating units of alcohol has been asked on Medical School exams in the past so make sure you know how to calculate them. The formula to work out units of alcohol is $[ABV (\%) \times \text{volume (ml)}] / 1000$. Mr Smith is drinking a quarter of a bottle each evening ($750/4 = 187.5$). Therefore, each evening he is drinking $(187.5 \times 12.5)/1000 = 2.34$ units. So, in a week he is consuming 16.4 units (E). The maximum amount in a week recommended for both men and women is currently 14 units.

Question 100- Answer C- Meningococcal Group B

The 6-in-1 vaccine is given to babies three times when they are 8, 12 and 16 weeks old. Currently it vaccinates against diphtheria, tetanus, pertussis, polio, Hib and Hepatitis B. Therefore, C is the correct answer. The Meningococcal group B vaccine is also given at 8 weeks old as well, but it is not part of the 6-in-1 vaccine

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- **Record your scores-** this enables us to calculate an average mark for the mock and gauge the difficulty of the paper as a whole. Note that this data is anonymous. No identifying information will be released.
- **Inform us of mistakes-** from spelling mistakes, to incorrect explanations let us know where we've gone wrong so we can change it.
- **Ask for more clarification-** maybe you want a clearer explanation of the difference between 2 answers or more justification for the single best answer, ask us and we'll get on it.

PAPER 1 Google Form- <https://forms.gle/R2Ti4734oQj3jnyz7>

I hope you found the Mock useful! Thanks for taking part!

Andrew Maud

PTS 2a Coordinator 2020