



Model Answers — NSW Practice SAQ Trial 2025.1

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Question 1 (12 marks)

A 65-year-old man presents to the emergency department with a 5-day history of increasing shortness of breath and bilateral peripheral oedema.

He is known to have critical aortic stenosis.

His observations are: GCS 15, alert, RR 25, HR 107, Sats 84% on room air, BP 92/70.

Part a (4 marks)

List four (4) features on chest x-ray which would be consistent with a diagnosis of pulmonary oedema.

Model Answer

- Upper lobe pulmonary venous diversion
- Pulmonary interstitial oedema:
 - o Peri bronchial cuffing and perihilar haze
 - o Septal (Kerley B) lines
 - o Thickening of interlobar fissures
- Pulmonary alveolar oedema:
 - o Air space opacification in a batwing distribution
 - o Air bronchograms
- Pleural effusions
- Fluid in interlobar fissures

Reference: <https://radiopaedia.org/articles/pulmonary-oedema>

Part b (4 marks)

His CXR is suggestive of pulmonary oedema. You are considering commencing him on NIV.

State the four (4) most significant issues faced in this decision.

Model Answer

With critical aortic stenosis, patients have a fixed cardiac output, even in the face of increased physiological demands.

- Avoid excessive **PEEP**; NIV increases intrathoracic pressure $\diamond$ leading to a reduction in venous return, reduction in preload $\diamond$ reduction in cardiac output/hypotension.
- avoid **hypotension** - Systemic hypotension reduces coronary perfusion pressure
- Avoid excessive **tachycardia** and to keep the patient in sinus rhythm: Excessive tachycardia increases myocardial oxygen demand and reduces the time in diastole during which the ventricle is filled.
- If an arrhythmia is present, there is an absence of the atrial kick to help fill the ventricle in diastole, hence ventricular filling and cardiac output will be further reduced.
- These patients depend on adequate left ventricular preload to maintain cardiac output.

Management strategy: It is important to ensure the patient is intravascularly replete, hence fluids may be required despite the presentation of fluid overload.

Marks given for the following points:

- NIV/ PEEP worsening hypotension
- Critical AS fixed cardiac output
- risk of ischaemia/ decreased coronary perfusion
- managing tachycardia
- managing hypoxia

- max 1/4 for a patient factor (eg: ACD, tolerance, agitation, mask fitting etc)
- maximum 2 marks if only hypotension discussed as a point

Reference:

<https://www.emra.org/emresident/article/the-crashing-patient-with-critical-aortic-stenosis>
<https://litfl.com/non-invasive-ventilation-niv/>

Part c (4 marks)

His trial of NIV fails.

State four (4) specific modifications in your approach to intubation in this man. Provide your rationale for each choice.

Model Answer

1. intravascular volume depletion from primary illness; **Preload** dependant: optimise preload; volume load with NS 250mL bolus x 4 as tolerated/
2. **Hypotension** on induction: avoid hypotension; invasive BP monitoring if possible before intubation/ inotrope support early/push dose aramine/ inotrope
3. **Tachycardia**/tachyarrhythmia: avoid tachycardia/arrythmia; ensure not in AF (may cardiovert if safe to do so), manage pain before induction e.g. fentanyl 100mcg iv/ ensure sufficient sedation with induction
4. Preoxygenation; challenging to use NIV or any form of **PEEP** as affects preload if needed, consider HiFlow/ nonrebreather

Ideally, candidates should address multiple principles in their answers to score full marks.

- Avoid hypotension - volume load/ drugs
- Avoid hypoxia
- Avoid tachycardia/ manage AF
- Identify that AS is preload dependent- strategies to optimise preload

Marks are also allocated for patient positioning/ most experienced operator/ specific discussion of equipment if a rationale is provided

If discussing induction agents- remember doses and give your rationale for use in this specific patient. note we have phenylephrine = Synthetic sympathomimetic with powerful α -receptor but minimal β -receptor effect. It causes vasoconstriction with increases in systolic and diastolic blood pressure and reflex bradycardia, lasting up to 15-20 min after IV administration. may be the best choice for inotrope.

Many candidates mention using adrenaline as their vasopressor of choice. You would avoid adrenaline in this patient as it will increase afterload, tachycardia and increases myocardial oxygen demand.

Question 2 (12 marks)

A 56yo F is brought in by ambulance to your emergency department after a seizure at home, which self-terminated after 5 minutes. She has a background of diabetes with end stage renal disease on haemodialysis for 3 years, and HIV.

On arrival her observations show:

BP 232/92 HR 94 sat 99% NRB, afebrile

GCS E1 V1 M6 = 9: localising with both arms

PEARL 3mm

Part a (3 marks)

State the definition of Hypertensive Emergency and two (2) initial management goals for the blood pressure in this patient.

Model Answer

Severe elevation in BP (eTG says "usually above 220/140", but lower BP accepted in answer, accept SBP180, 0.5 if it simply says "severe" without a numerical indicator or severity) with end organ damage or dysfunction. (1) – don't accept "impaired perfusion", must be "damage" or imply irreversibility. Must have end organ damage for mark.

Initial management goals:

- 1 mark for stating concept of gradual rather than rapid BP reduction
- 1 mark for correct rate "Reduce BP by no more than 25% in the first 2 hour" – accept values 20%-30% in first 1-4 hours

Part b (3 marks)

List three (3) neurological emergencies associated with hypertension that need to be considered in the differential for this patient.

Model Answer

- Ischaemic stroke
- Haemorrhagic stroke (max 1 mark per intracranial haemorrhage, e.g. SAH + intraparenchymal haemorrhage + aneurysm rupture = 1 mark total)
- Hypertensive encephalopathy.
- Head trauma after seizure
- Posterior reversible encephalopathy syndrome (PRES) is a radiological diagnosis (still gets a mark)
- Dissection MUST SAY with carotid/cerebrovascular involvement or similar
- 0 marks for neurological emergencies that can cause HTN, e.g meningitis, SOL

Part c (3 marks)

You plan to use an intravenous infusion to manage her blood pressure; State three (3) options, including dose and details regarding dosing regimen and administration.

Model Answer

- sodium nitroprusside 0.3 micrograms/kg/minute by intravenous infusion, increasing by 0.5 micrograms/kg/minute every 5 minutes, up to 10 micrograms/kg/minute
- esmolol 500 micrograms/kg intravenously, over 1 minute, followed by 50 to 200 micrograms/kg/minute by intravenous infusion

- glyceryl trinitrate 10 micrograms/minute by intravenous infusion, increasing by 5 micrograms/minute every 5 minutes, up to 100 micrograms/minute
- labetalol 20 mg intravenously, over 2 minutes, repeated after 10 minutes if there is no or little BP reduction. Follow by 20 mg/hour by intravenous infusion, increasing by 20 mg/hour every 15 minutes, up to maximum rate 160 mg/hour. Usual effective total dose 50 to 200 mg
 - hydralazine IV infusion, initially 200–300 micrograms/minute. Maintenance, 50–150 micrograms/minute. (AMH)(3-18mg/h)
 - nicardipine 5mg/h max 15mg/h.
 - clevidipine IV infusion, initially 1–2 mg/hour; increase according to response by doubling the dose every 90 seconds, then, as desired BP is reached, by smaller increments every 5–10 minutes

Part d (3 marks)

There is a delay in drawing up the infusion; List three (3) options for parenteral management of intermittent dosing until the infusion is prepared. Include details regarding dosing regimen.

Model Answer

- hydralazine 1 mg intravenously, repeated every minute as required up to a maximum total dose of 10 mg
- clonidine 150 micrograms intravenously, repeated every 3 to 6 hours as required to a maximum total dose of 750 micrograms
- metoprolol tartrate 1 mg by rapid intravenous injection, repeated every minute as required up to a maximum total dose of 5 mg.
- labetalol 20mg IV q10min max 80mg
- 0 marks for esmolol, GTN -> not given as bolus drugs

Referenced EtG and uptodate; based on JR

Question 3 (12 marks)

A previously healthy 21 year old man represents to your tertiary ED reporting a sore throat. He has no past medical history and is usually on no regular medications.

He initially presented 2 days ago with a 1-week history of sore throat, cough productive of brown sputum, odynophagia, fever, rigors and right-sided neck, ear and pleuritic chest pain. He was diagnosed with quinsy. The abscess was drained by the ENT registrar and he was treated with IV benzylpenicillin and dexamethasone. He improved and was discharged yesterday. His symptoms today are identical to his original presentation, and he is given a triage category 4 and placed in the waiting room, with no observations being performed.

When you review him, he is febrile at 38.7°C and tachycardic at 125 beats per minute. His other observations (including RR, sats and BP) were in the normal range.

Part a (2 marks)

What are the two (2) identifiable risk factors for sepsis in this presentation?

Model Answer

- From sepsis pathway
- Re-presentation within 48 hours
- Recent surgery, invasive procedure or wound

Accept other reasonable e.g. IVDU, atypical presentation

Others not applicable here are:

- Indwelling medical device
- Immunocompromised
- Age > 65 years
- Fall

Ref: https://www.cec.health.nsw.gov.au/_data/assets/pdf_file/0005/291803/Adult-Sepsis-Pathway.PDF

Part b (1 mark)

State another symptom (aside from those already listed in the stem) which may increase your suspicion of this patient having sepsis.

Model Answer

- Breathlessness
- Altered cognition
- Urinary symptoms – dysuria, frequency; also reduced UO or anuria

Already listed in stem: Fever or rigors Cough/sputum/

Not applicable - Line associated infection/redness/swelling/pain

Less relevant - Abdominal pain/distension/peritonism

Part c (3 marks)

His CXR is shown below.



State one (1) significant finding on the CXR, your provisional diagnosis for this presentation and one (1) prioritised differential.

Model Answer

- Chest PA revealed multifocal nodular infiltrates that are mainly in the right lung field and left lower lung fields
- Accept:
 - o pneumonia or pulmonary tuberculosis. Or Lemierre syndrome.
 - o Metastatic disease also a possibility.

Ref: <https://www.kjim.org/upload/kjim-22-211.pdf>

Part d (3 marks)

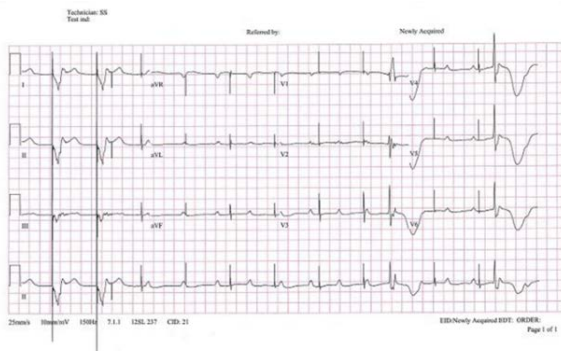
Identify three (3) administrative issues that arise from this case that will need to be addressed and state your rationale for each.

Model Answer

1. medical; initial admission did not address the full symptom complex the patient presented with which may have led to an earlier diagnosis and initiation of treatment.
2. Nursing; no obs done at triage leading to inappropriately low triage category for presentation; potential for life threatening illness to be missed.
3. System; review details of sepsis pathway and its application e.g. time to antibiotics. And recognition of the unwell patient.

Question 4 (12 marks)

A 16 year old boy with a congenital heart problem presents to your ED with syncopal episodes. An ECG is taken (see below).



Part a (5 marks)

List the five (5) most important features of this ECG.

Model Answer

1. ECG showing paced rhythm with failure to capture.
no atrial pacing evident. Probably ventricle only pacing.
Standard speed and voltage.
2. Underlying p waves present . 10 visible on rhythm strip giving atrial rate of 72 per min
3. no relationship between p waves and qrs complexes. Complete heart block.
12 non p wave electrical events noted
complex 1 and 2 appear as pacing spikes with ventricular capture
complexes 3 to 8, and 10 and 11 appear as pacing spikes with no ventricular capture
these are independent of the p waves, with complex 4 superimposed on the p waves and
complex 8 just preceding the p wave.
Complexes 9 and 12 are endogenous beats
4. The ventricular rate would then be $4 \times 6 = 24$ per minute.
2 of the beats are paced (complexes 1 and 2) and 2 of the beats are endogenous (complexes 9 and 12).
the intrinsic axis is indeterminate.
The endogenous QRS is not widened and shows T wave inversion in lead II and V4-V6 (the only leads where it is seen).
The ST segments in these leads are isoelectric.
5. There are no other acute changes.

Part b (1 mark)

State your diagnosis.

Model Answer

- ECG showing paced rhythm with failure to capture in symptomatic 16 year old with congenital heart disease in complete heart block. Significant life threat.

Part c (3 marks)

List the three (3) most possible causes for these changes.

Model Answer

Failure to capture occurs when paced stimulus does not result in myocardial depolarisation.

Multiple causes including

1. electrode displacement,
2. wire fracture,
3. electrolyte disturbance,
4. MI or
5. exit block (increased stimulation threshold at electrode site).

Part d (3 marks)

List three (3) options for management.

Model Answer

- Seek and treat underlying cause
- Patient will need urgent intervention
- Initial options include atropine, isoprenaline, external or transcutaneous pacing
- Subsequently may require pacemaker or lead replacement

Question 5 (12 marks)

A 39 yo male has presented after having a seizure with left shoulder pain

You are concerned that he has a posterior shoulder dislocation.

The AP and lateral views of his shoulder are shown below.



Part a (2 marks)

What position would you expect him to be holding his left arm?

Model Answer

- internal rotation and adduction

Part b (4 marks)

List four (4) features you would look for on the AP xray. Indicate which of these are visible on this set of xrays.

Model Answer

- Head posterior on lateral or axillary view- AP view ; overlapping of humeral head and glenoid
- Radiographic findings include:
 - o absence of external rotation on images in a standard shoulder series is a clue
 - o trough line sign (Reverse Hill Sachs): dense vertical line in the medial humeral head due to impaction of the humeral head
 - o loss of normal half-moon overlap sign, in which the glenoid fossa appears vacant due to the lateral displacement of the humeral head
 - o vacant glenoid sign; empty appearance of the anterior glenoid fossa
 - o Gap sign or rim sign: widened glenohumeral joint >6 mm
 - o acute angle of the scapulohumeral arch (Moloney's arch) is also present and can be used to distinguish from anterior dislocation
 - o light bulb sign -internal rotation of the humerus makes the cortex of the humeral head more distinct, giving the head a lightbulb like appearance: fixed internal rotation of the humeral head which takes on a rounded appearance = non specific for posterior dislocation and can occur with any cause of internal rotation of the humerus
 - o Reverse Bankart lesions - involves a tear of the posterior labrum of the glenoid and often difficult to see unless there is a bony component (best seen on MRI)

Part c (4 marks)

State the four (4) key steps in the reduction of this injury.

Model Answer

1. Firmly and gently hold upper arm (above elbow) and forearm
2. Place into further adduction and internal rotation
3. Lift elbow to level of shoulder
4. Externally rotate

Note - if the scapula starts to protract (rotate forwards around chest wall) then you will need to move the elbow slightly across the front of the torso in order to maintain adduction and keep the head at the posterior glenoid rim. If you don't do this, it will stay wedged behind the rim.

The humeral head may reduce during manoeuvres 1,2 or3

Part d (2 marks)

State how the arm should be immobilised after the reduction.

Model Answer

acute reduction and immobilization in external rotation for 4 to 6 weeks technique

- i. immobilize in 10-20 degrees of external rotation with elbow at side (slight abduction)
- ii. after 6 weeks advance to physical therapy (rotator cuff strengthening and periscapular stabilization) and activity modification (avoid activities that place arm in high-risk position)

References:

<https://dislocation.com.au/posterior-shoulder>

<https://radiopaedia.org/articles/posterior-shoulder-dislocation?lang=gb>

<https://www.orthobullets.com/shoulder-and-elbow/3051/posterior-shoulder-instability-and-dislocation>

Question 6 (12 marks)

A 2yo male has been brought to your emergency department after an episode of choking followed by one episode of vomiting, 20 minutes prior to presentation. He had been playing with a small toy car in his mouth at the time. He is currently sitting on his father's lap in a chair beside the paediatric resus bay bed.

Part a (4 marks)

List four (4) features that suggest a mild obstruction to the upper airway.

Model Answer

- Able to speak or cry, may be hoarse
- Intermittent stridor or occasional stridor
- Minimal or no work of breathing
- Good air entry

0.5 marks for - excessive salivation or "effective cough/ineffective cough"

Part b (4 marks)

List four (4) features that suggest a moderate obstruction to the upper airway.

Model Answer

- Tachypnoea
- Stridor
- Prolonged inspiratory time
- Moderate work of breathing, nasal flaring, grunting, paradoxical chest movement
- Decreased air entry

0.5 marks for - excessive salivation or "effective cough/ineffectivecough"

Note signs of severe obstruction:

- Desaturation is a late sign.
- Slow respiratory rate or marked tachypnoea
- Sniffing or tripod position
- Agitated or drowsy conscious state
- Severe work of breathing
- Markedly reduced or no air movement
- Silent gagging or coughing
- Hypoxia (late sign)
- Total obstruction will rapidly progress to unconsciousness and cardiorespiratory arrest

Part c (4 marks)

He has none of the features listed in the answers above. A chest Xray is performed.

List four (4) features you would look for in the CXR (apart from a radio-opaque foreign body) of this child.

Model Answer

- Segmental or lobar collapse
- Hyperinflation distal to obstruction causing air trapping
- Mediastinal shift
- Pneumothorax

Half marks for below as late sign:

- Consolidation suggestive of pneumonia
- Pulmonary abscess and bronchiectasis are signs of a chronic impacted FB

Ref: https://www.rch.org.au/clinicalguide/guideline_index/Foreign_bodies_inhaled

https://www.rch.org.au/clinicalguide/guideline_index/Acute_upper_airway_obstruction

https://www.rch.org.au/clinicalguide/guideline_index/assessment_of_severity_of_respiratory_conditions

Question 7 (12 marks)

A 34yr old male has self-harmed with a penetrating stab wound to the left side of his neck.

Part a (5 marks)

List five (5) hard signs of vascular injury.

Model Answer

- Active pulsatile haemorrhage
- Rapidly expanding haematoma
- Distal ischaemia
- Bruit or palpable thrill
- Shock
- focal neurological deficit/ stroke

Part b (5 marks)

The patient is in the resuscitation bay with large bore IVC being placed, cross matched and massive transfusion protocol has been activated. Other team members are preparing for a difficult airway.

List five (5) steps in your escalating ED management options for haemorrhage control in the neck.

Model Answer

- Fine digital compression/ local/ direct pressure in addition to fine digital pressure.
- Stacked (pyramid) dressing
- Haemostatic agent packing e.g., gauze impregnated with kaolin, chitosan can promote clot formation
- Figure of eight suture
- Foley Catheter Foley catheter can be inserted into the wound tract and the balloon inflated to provide tamponade.
- Clamp : last-resort measure and should only be performed by someone with experience, as improper placement can worsen the injury. It is also important to remember that clamping should be performed as a bridge to definitive surgical management, and not as a definitive management strategy.

Part c (2 marks)

The patient is currently taking Dabigatran for a previous PE.

State the mechanism of action and the option for reversal of this drug.

Model Answer

- Direct thrombin inhibitor
- Idarucizumab 5g IV bolus

Question 8 (12 marks)

A 72 year old female presents to your emergency department with acute agitation and a history of three falls. She has a background of epilepsy, depression and hypertension. There is no other past medical history. She usually a GCS 15, independent with activities of daily living and from home. Her medications are currently unavailable.

On examination, she is confused and pulling at her lines. She is awake and answers simple direct questions. She appears to have new weakness in her left upper limb but otherwise no focal neurology. There are no external signs of trauma. She appears well hydrated.

Her observations are all within normal range for her age. Her husband has accompanied her and is able to provide further history.

Part a (2 marks)

What two (2) historical features would suggest that this presentation is not a stroke?

Model Answer

1 mark for any of the following:

- History of loss of consciousness or syncope
- History of seizure activity
- From Rosier scale Nor et al , Lancet Neurology 2005

ALSO

- Hypoglycaemia with ambulance

0.5 marks for :progressive worsening of symptoms over time

- known prior left upper limb weakness
- known cerebral mets
- previous migraine with weakness

zero marks for (Did not accept):

- fluctuation of symptoms (occurs with stroke)
- delirium (common with stroke)
- injury to the limb (in the stem)
- fever

Part b (2 marks)

Blood and urine samples are obtained. Her biochemistry results are shown below.

	Result	Normal Range
Sodium	114 mmol/L	(135 - 145) mmol/L
Potassium	4.3 mmol/L	(3.5 - 4.8) mmol/L
Glucose	7 mmol/L	3.0 - 7.7 mmol/L
Cl	95 mmol/L	95 - 110 mmol/L
Urea	6.3 mmol/L	2.9 - 8.2 mmol/L
Creatinine	70 microM/L	70 - 120 microM/L
Osmolality	243 mOsm/Kg	275 - 295 mOsm/kg

What two (2) tests would you order on the patient's urine sample, and what results would suggest a diagnosis of SIADH?

Model Answer

- Urine sodium > 20 mmol/L (accept urine sodium >20-40mmol/l)
- Urine osmolality > 100 mmol/Kg

Must have units and numbers to get the full mark

Part c (4 marks)

List four (4) different medications from 4 different pharmaceutical classes that may have caused her presentation.

Model Answer

(0.5 for each medication and 0.5 for each matched pharmaceutical class total 4 marks)

- **Antidepressants -likely SIADH**
- SSRIs
- Tricyclic
- MAOI
- Venlafaxine
- **Antiseizure medications- likely**
- Carbamazepine
- Sodium valproate
- Lamotrigine
- **Miscellaneous- likely**
- Opiates
- NSAIDs
- Clofibrate
- Nicotine
- Amiodarone
- Proton pump inhibitors
- Diuretics

also accept:

- antipsychotics e.g. risperidone, haloperidol
- levetiracetam
- ACEI (all this class)
- some chemotherapy e.g. doxorubicin
- some antibiotics e.g. ciprofloxacin

Did not accept drugs that have a tendency to increase serum Na eg

- Li
- carbimazole
- phenytoin
- prednisolone
- thyroxine

Also did not accept

- digoxin (does not cause severe hypokalaemia)
- benztropine
- cephalosporins

Part d (4 marks)

While in the department, the patient has a seizure.

Name the IV agent of choice to manage this seizure. State explicit details on the administration of this agent.

Model Answer

- 3% saline
- 1-2ml/kg over 10-20 minutes
- and repeat as necessary (up to 3 times)
- aiming to raise sodium by 4-6 mmol/L in 1 hour

OR

- Alternatively, infusion at 4-6ml/kg/hr aiming for resolution of seizures or Na of 120mmol/L

OR

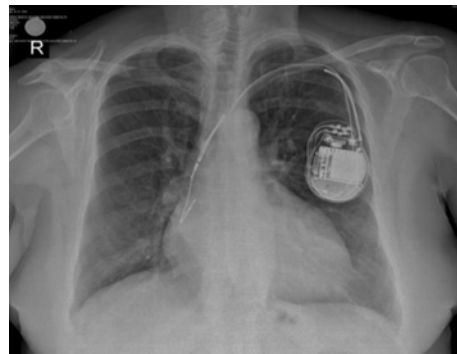
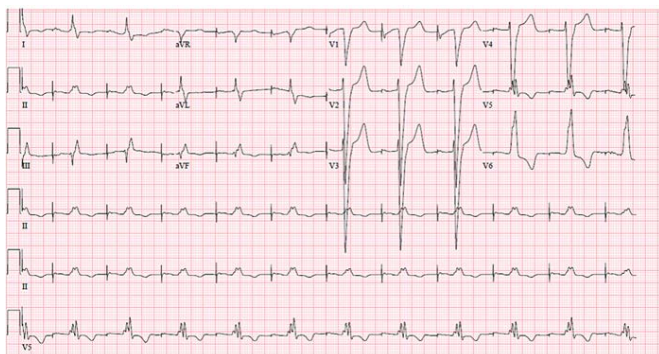
- 100-150ml bolus over 10-20 minutes

0.5 marks for:

- Fluid restriction 800ml-1L/day aiming for increase in Na 0.5 mmol/L/hour (or 10mmol/24 hours) after acute treatment

Question 9 (12 marks)

A 75F presents with pre-syncope. Her CXR and ECG are shown below.



Part a (2 marks)

State two (2) significant findings on this ECG.

Model Answer

- Atrial paced rhythm
- Loss of ventricular pacing

Part b (2 marks)

State two (2) significant findings on the CXR.

Model Answer

- The ventricular lead is circulated around the generator and lead comes up to the superior vena cava while the atrial lead is in normal place (can state Reel syndrome, but has to mention leads separately)

Part c (4 marks)

The patient is aware that she has a pacemaker and has the following written on a piece of paper ; "DDD-ICD". Explain in lay terminology what this means.

Model Answer

- Dual Chamber Implantable Cardioverter Defibrillator
- Dual-chamber ICDs are indicated for patients who require an ICD in addition to cardiac pacing for sinus node and/or AV node conduction disease. The letters refer to Pacing Sensing and response to sensing:
- **Position I:** Chambers Paced =Refers to chambers paced.
- **Position II:** Chambers Sensed =Refers to the location where the pacemaker senses native cardiac electrical activity.
- **Position III:** Response to Sensing Refers to pacemakers response to sensed native cardiac activity.
 - T = Sensed activity results in triggering of paced activity
 - I = Sensed activity results in inhibition of pacing activity
 - D = both trigger and inhibition

The ICD means you have both a pacemaker and a defibrillator (can give you a shock if you need it) (1 mark)

The 3 letters tell me that it works on the top (atria, small pump) and bottom (ventricle, big pump) of your heart (D stands for Dual) (1 mark)

Your pacemaker can sense if your heart has made its own rhythm (1 mark) and decide if it needs to help by pacing or not. (1 marks)

Part d (4 marks)

You plan to use a magnet to assist with the management of this patient.

State the effect of the use of a magnet in this patient and list three (3) situations where it is clinically indicated to do this.

Model Answer

- magnet application to an Implantable Cardioversion Defibrillator (ICD) results in defibrillator deactivation. 1 mark
- ICD (1 mark for any of each of)
 - o will turn off the antiarrhythmic programme (potentially dangerous!) -> need to have a defibrillator nearby
 - o no effect on backup pacemaker
 - o inactivate during CPR (compressionist may feel the 40J shocks from the ICD -> transient discomfort, minimal risk of harm)
 - o inactivate after death in non-coroner's cases
 - o inactivate during transcutaneous pacing
 - o inactivate when inappropriate shocks occurring
- compare with Pacemaker
- will default to asynchronous mode or a fixed rate (turns off sensing)
- Rate depends on battery life (usually 70-90/min)
- can be used to identify oversensing
- help identify battery failure as a cause of failure to capture

Ref: <https://www.cureus.com/articles/16722-a-presentation-of-twiddlers-syndrome-with-underlying-ratchet-mechanism#!/ecg> from here

Question 10 (12 marks)

You have been asked to conduct a root cause analysis (RCA) of the following incident that occurred on a night shift.

MEDICAL NOTES

- 0330 SB Dr x emergency registrar
- 68yr-M, asymptomatic new onset AF
- Asked by cardiology registrar to perform DC cardioversion.

Vital signs

HR	98 bpm (irregular)
BP	130/85
RR	14
Sats	98% RA
T	38.1
Weight	72kg

NURSING NOTES

- 0332 Propofol 5mg/kg = 350mg iv
- Cardioversion 200J
- SR 85

0335	BP 70/50
0345	1mg of metaraminol given.
0350	2mg of metaraminol given.
0350	BP 100/60
0355	BP 110/85

0630 noted to have right sided deficit; for CT angio

Part a (3 marks)

List three (3) issues that an RCA aims to determine.

Model Answer

1. what happened; Candidate must state the issue "what happened" to score full 3 marks
2. why it happened
3. the circumstances that could lead to it happening again

Part b (2 marks)

State how an RCA aims to influence clinical practice.

Model Answer

1. a plan to prevent/ decrease recurrences (risk minimisation)
2. reduce the severity of outcome

For full marks must have both concepts

Part c (3 marks)

List the three (3) most important individual medical contributing factors that you would investigate further in this case.

Model Answer

1. incorrect dose of propofol, should be 1mg/kg
2. late recognition and management of significant hypotension
3. No urgency to cardiovert stable patient overnight

NB examiners may add to the list of reasonable answers as this type of question is designed to allow the trainees to consider options at a consultant level – candidates expected to have 3 reasonable answers

Candidate is expected to state what they had thought may have gone wrong when the patient got an inappropriate dose of propofol leading to hypotension which was not treated and then a stroke. The procedural sedation was the issue and not the cardioversion as such

Part d (4 marks)

List the four (4) most important organisational contributing factors that you would investigate further in this case.

Model Answer

1. state of the ED at the time of the error eg crowding
2. use of procedural sedation checklist by medical and nursing staff
4. credentialing for procedural sedation by ED trainees
5. policy in regards non-urgent procedural sedation not being done on the night shift with less resources
5. training and education of staff around point 2 (sedation checklist and policy)
6. training and education of staff around point 4 and escalation to SS on call or overnight policy for mx of department.

NB examiners may add to the list of reasonable answers as this type of question is designed to allow the trainees to consider options at a consultant level – candidates expected to have 4 reasonable answers

note part D asked for organisation contributing factors; No marks in this section for patient factors or factors relating to the specific event.

No additional marks for repetition i.e. same issue listed twice, just differently worded

Candidate expected to identify that the error was done by the ED team including the specialist on call/ ED departmental processes that allow an ED trainee to proceed with an unsafe procedural sedation after hours.

If candidates have identified the core of the scenario (i.e. overnight (high risk procedure done when not indicate why did this occur?) ED trainee and ED nurse gave too much propofol (why did this occur?) and did not act on low BP (why did this occur?) and then patient had a stroke – then should be able to score marks in parts C and D

Question 11 (12 marks)

You have been asked to review a 13yoF who has presented with self harm.

Part a (2 marks)

Define emotional abuse of a child, as described by the Australasian College for Emergency Medicine (ACEM).

Model Answer

ACEM defines emotional abuse of a child as a parent or caregiver's inappropriate verbal or symbolic acts toward a child, or a pattern of failure over time to provide a child with adequate non-physical nurture and emotional availability. (1 mark for each distinct element)

Part b (4 marks)

List four (4) historical factors that, in the context of a 13-year-old female presenting with self-harm, raise concern for emotional abuse.

Model Answer

1. Family history of domestic violence or child abuse (including exposure to violence).
2. Parental/carer history of substance abuse.
3. Parental/carer history of mental health disorders.
4. Unstable housing or homelessness.
5. Lack of consistent, supportive caregiving relationships (e.g., frequent changes in caregivers, limited social support for the family).

Part c (3 marks)

List three (3) behavioural or emotional indicators (apart from self-harm) that might be observed in a child suspected of experiencing emotional abuse.

Model Answer

1. Withdrawal or depression.
2. Aggressive or acting-out behaviours.
3. Difficulty with social interactions or forming relationships.
4. Changes in eating or sleeping patterns.
5. Expressed fears or anxieties related to specific people or situations at home.

Part d (3 marks)

Her mother now arrives in the department.

List three (3) examples of parental behaviours you might observe that constitute emotional abuse.

Model Answer

- **Belittling/Criticizing:** Harmful because it erodes the child's self-esteem and creates feelings of inadequacy.
- **Threatening/Intimidating:** Harmful because it creates a climate of fear and anxiety, hindering the child's sense of security.
- **Isolating:** Harmful because it deprives the child of social support and healthy relationships, leading to feelings of loneliness and isolation.
- **Ignoring/Rejecting:** Harmful because it conveys a message of unworthiness and rejection, damaging the child's sense of belonging.
- **Manipulating/Controlling:** Harmful because it undermines the child's autonomy and sense of control over their own life, leading to feelings of helplessness.
- **Neglect.** Parent did not arrive with the child

Question 12 (12 marks)

A 35 year old army veteran man presents to your small rural emergency department with left thigh swelling that has been progressively worsening for 5 days. A combat injury 15 year prior left him a T12 paraplegic, but he does not have any other significant medical history, is very fit and completely independent. He fell awkwardly during a wheelchair rugby match the day before his leg started swelling, but did not notice any issues at the time. His thigh is now tensely swollen.

An x-ray is done which shows a mid-shaft femur fracture. His leg is placed in traction. The orthopaedic team at your nearest referral centre have accepted care. As part of his pre-operative work up a set bloods tests are done.

His electrolyte studies are shown below.

		Reference range
Sodium	136 mmol/L	(138 - 146)
Potassium	6.5 mmol/L	(3.5 - 4.9)
Urea	19.7 mmol/L	(3.7 - 8.4)
Creatinine	422 umol/L	(77 - 119)
Magnesium	1.04 mmol/L	(0.76 - 0.99)
Calcium	1.37 mmol/L	(2.25 - 2.49)
Calcium-Corrected	1.87 mmol/L	(2.25 - 2.49)
Phosphate	3.65 mmol/L	(0.95 - 1.6)
Albumin	15g/L	(38 - 48)

Part a (1 mark)

What is the most likely explanation for these results?

Model Answer

- Compartment syndrome, with secondary rhabdomyolysis causing a severe acute renal injury with hyperkalaemia.

Part b (4 marks)

You recognise that thigh compartment pressures need to be measured as a matter of urgency. However, your hospital does not have any specialised equipment for doing so (eg Stryker device or similar).

Describe a method for measuring compartment pressures using equipment you would reasonably expect to find in an emergency department resuscitation bay.

Model Answer

Use arterial line + needle

- Arterial line flushed and zeroed, with the transducer at the level of the thigh
- Measure anterior, medial/adductor and posterior compartments all within 5cm of level of fracture
- Chlorhexadine or iodine skin prep
- Probably don't need local anaesthetic given insensate limb
- Flushed long 18G needle attached to end of arterial line set up
- Insert needle 90 degrees to skin, to a depth of 2 – 3cm, read pressure from monitor
- Confirm compartment pressure transduction by squeezing limb to see a corresponding increased pressure on the monitor.

Part c (1 mark)

What pressure would indicate the need for emergency fasciotomy?

Model Answer

- ACS delta pressure = diastolic blood pressure - measured compartment pressure
- ACS delta pressure <20 to 30 mmHg indicates need for fasciotomy (we use <30 mmHg)

Part d (4 marks)

You proceed to perform a thigh anterior compartment fasciotomy, after gaining the consent of the patient and in consultation with the receiving orthopaedic team. The patient is in a resuscitation bay with adequate nursing and medical support present, and you have gathered all the equipment you require.

Describe the key remaining steps of the procedure.

Model Answer

- Gown glove prep drape
- Incision lateral thigh from level of greater trochanter to lateral condyle of femur
- Incise through fascia lata/fascia of vastus lateralis until muscle belly on show
- Re-measure compartment pressure to ensure adequate decompression

Part e (2 marks)

Should this patient be given intravenous bicarbonate as part of his emergency department management? Please provide two (2) reasons to support your answer.

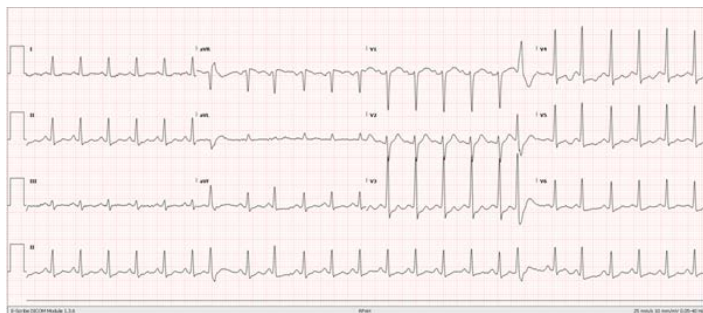
Model Answer

- Bicarbonate should not be given
- It will worsen hypocalcaemia by precipitating $\text{Ca}(\text{HCO}_3)_2$
- He has an established kidney injury, and so urinary alkalinisation to prevent AKI in rhabdomyolysis is not indicated.
- Other treatments for hyperkalaemia more appropriate

Question 13 (12 marks)

A 50 yo male engineer at your hospital suffered an electrical injury after contacting power lines while working. He was noted to be unconscious by his workmates who were able activate the arrest call. The arrest team noted he was in VF and were able to revert him with a single shock of 200 joules on a biphasic defibrillator and have brought him to your department. He is conscious (GCS 15), maintaining his own airway with a BP of 130/80.

His ECG on arrival to the department is shown below:



Part a (3 marks)

State three (3) parts of your standard ACLS algorithm that you would alter/modify if you were looking after this patient on first contact as part of the arrest team.

Model Answer

1. Prolonged ALS - generally healthy (not ischaemic) hearts with higher likelihood of recovery
2. Aggressive fluid resus often required, esp. if extensive burns or signs of muscle necrosis
3. Maintain spinal motion restriction in thrown patients

Similarly to standard ACLS: . Early defib & ACLS - VF commonest lethal rhythm; pre-hospital

Also At scene/pre-hospital – cardiac arrests treated first if multi-casualty; reverse of usual mass casualty triage (not relevant to this question)

Part b (3 marks)

Apart from the ECG, List three (3) prioritised lab or bedside investigations you would order for this man in the emergency department. Provide a rationale for each test.

Model Answer

- Serum troponin concentration for Cardiac / myocyte injury
- Serum urea and electrolyte concentrations for renal damage/baseline from rhabdo
- CK for rhabdo
- Urine dipstick—if positive for blood, perform urinalysis for myoglobinuria

Part c (6 marks)

He is keen to get back to work to complete the job he was working on and wants to understand why you have asked him to stay in hospital. State your response and outline your rationale for this response.

Model Answer

- Should not return to work today.(1 mark) Needs admission for cardiac monitoring (at least 12 hours) (1 mark) , even if no traumatic or burns injuries (which have not been assessed yet – 1 mark). rational – *multiple independent risk factors for life threat if recurrence or deterioration of any of the following.*

- **Still has abnormal ECG – tachycardia, short PR (must have this one to pass)** 1 mark
- Has had a VF arrest
- Had loss of consciousness, possible seizure (not described)
- Bloods may show cardiac or muscle damage or ARF which can develop later
- 50M might also have underlying cardiac disease.

Any 2 of the above is 1 more mark each.

Question 14 (12 marks)

A 68 year old previously well woman is brought to your tertiary emergency department with fevers and breathlessness. Her rapid Covid 19 swab is negative. On arrival her vital signs are:

HR	135
BP	85/35
Temp	39.5
SpO ₂	84% on 15L O ₂

The results of her full blood count are shown below.

Hb	81 g/L	(135-175) g/L
WCC	$102 \times 10^9/L$	$(3.5-10.0)10^9/L$
Plt	$56 \times 10^9/L$	$(150-400)10^9/L$

She undergoes RSI and the mobile film taken post intubation is shown below:



Part a (2 marks)

List two (2) relevant findings on the chest X-ray.

Model Answer

- ETT in oesophagus
- Diffuse patchy alveolar opacities bilaterally

Part b (4 marks)

List four (4) possible causes of the chest X-ray changes.

Model Answer

- Leukostasis (A differential appreciating the pan cytopenia and severe elevation in wcc should prompt a hematologic malignancy differential and that the presentation is highly suspicious for AML induced leukostasis. There are other possibilities, including that the wcc is either reactive or paraneoplastic from another etiology. and the other abnormalities could represent DIC or chronic illness.)
- Severe community acquired pneumonia
- ARDS
- Alveolar haemorrhage
- Pulmonary oedema
- Pneumonitis (viral/chemical/aspiration/hypersensitivity)
- lymphangitis carcinomatosa.

- No additional marks were given to different infection types - such as viral, bacterial, fungal, TB but should have different groupings such as infection, haemorrhage etc.

Part c (6 marks)

List six (6) prioritised steps in your immediate (next 15 minutes) of management, giving doses and end-points where necessary. Provide your rationale for each choice.

Model Answer

- **Urgent re-intubation**
 - o Ketamine 1mg/kg and rocuronium 1.2mg/kg
 - o Ongoing sedation
- IV antibiotics – tazocin 4.5g IV and gentamicin 6mg/kg (immunocompromised)
- Invasive monitoring – IDC, arterial line, CVC
- Fluid resuscitation with 1-2 L 0.9% saline aiming for MAP > 65, urine output > 0.5ml/kg/hr
- Noradrenaline infusion 0.1-1mcg/kg/min if BP fails to improve, aiming for MAP > 65
- Urgent haematology consult for leukapheresis +/- bone marrow biopsy and induction chemotherapy
- ICU admission

Maximum 3 marks out of 6 if not recognising need for urgent re-intubation.

Question 15 (12 marks)

A 55 year old male, wheelchair bound patient with chronic transverse myelitis presents with 2 hours of a sudden pounding headache, blurred vision and anxiety.

His observations are:

GCS	15
HR	50 (regular)
BP	180/90 mmHg
RR	22/min
SpO2	98% room air
Temp	37.5 degrees

He has an IDC insitu.

Part a (4 marks)

List four (4) steps that can be taken at triage for this patient.

Model Answer

- Ask patient and carer if they suspect a cause.
- Elevate the patient's head and lower the legs (this will help lower BP while cause is identified).
- Loosen any constrictive clothing, such as an abdominal binder or compressive stockings.
- Check bladder drainage equipment for kinks or other causes of obstruction to flow, such as clogging of inlet to leg bag or overfull leg bag.
- Monitor BP every 2 to 5 minutes.
- Avoid pressing over the bladder.

Can score mark for analgesia in either part A or B, but not both.

Part b (2 marks)

List two (2) medications you would consider using to address his symptomatology. Give details.

Model Answer

- **Glyceryl Trinitrate (GTN)** Do Not Use Gtn Spray, Tablets Or Patch If A Medication For Erectile Dysfunction Hasbeen Taken In Last 24 Hours,
- Administer one spray of glyceryl trinitrate (GTN) (400 mcg Nitrolingual Pump Spray), OR if spray is unavailable, place half GTN tablet (300 mcg Anginine) under tongue, or apply one 5 mg/24 hours GTN Transdermal Patch to chest or upper arm (patch should be removed as soon as hypertension resolves).
- alternative (short-acting) antihypertensive agent, such as **captopril** should be used. Captopril, administered sublingually as a 25mg tablet (taking about 3 minutes to dissolve under the tongue), can get mark for hydralazine (not oral), prazosin and others that could be given.
- Adequate analgesia (e.g. **morphine**) should be administered where there is a known cause of ongoing nociception until resolved.

Part c (6 marks)

List the two (2) most common causes of this presentation and for each state a beneficial intervention. Include details where necessary.

Model Answer**1. **Blocked Catheter:****

- Empty the leg bag and estimate volume. Consider fluid intake/output, and normal drainage pattern. Use a bladder scan to estimate bladder volume objectively.
- If catheter is suspected to be blocked, gently irrigate the bladder with no more than 10 to 15mls of sterile normal saline at body temperature.
- If urine does not drain after irrigation, re-catheterize using lubricant containing a local anesthetic (e.g., lignocaine 2%) gel. In men, remove the catheter, apply anaesthetic jelly into the urethra, and prevent leakage by squeezing the penis tip for 2 to 3 minutes to relax the external urethral sphincter.
- Replace the catheter, drain urine, and be alert for sudden hypotension due to rapid bladder drainage or sudden resolution of autonomic dysreflexia.

2. **Fecal Evacuation:**

- Ensure the bladder is empty. If symptoms persist, apply a generous amount of lignocaine gel onto the anal sphincter region and into the rectum. Wait five minutes.
- Gently insert a finger to remove fecal matter. Monitor blood pressure manually before and during digital stimulation.
- If BP increases significantly, cease digital stimulation and only recommence following administration of suitable medication.

– no marks for enema as may worsen. Emphasis on gentle.

Question 16 (12 marks)

A 5 yr old developmentally delayed (preverbal) male presents to your ED with abdominal pain. He has a known history of vesicoureteric reflux, for which he is awaiting surgery. His vitals are within normal range but he is crying and distressed. His weight today is 20kg.

Part a (5 marks)

List five (5) clinical features you would observe to assess this patient as having a severe level of pain.

Model Answer

- Five categories: Face, Legs, Activity, Cry, and Consolability.
- Frequent to constant quivering chin, clenched jaw
- Kicking or legs drawn up
- Arched, rigid or jerking
- Crying steadily, screams, sobs, frequent complaints
- Difficult to console or comfort
- Would all indicate severe pain

Part b (4 marks)

You plan to give him intranasal fentanyl. State in detail the initial 30min of your prescription for this medicine.

Model Answer

- Fentanyl Intra-nasal
- >12 months: 1.5 microg/kg = 30 micrograms for 20Kg (max 100 microg) for first dose (1 mark)
- 0.75 microg/kg = 15 micrograms for 20kg for subsequent doses after 10 minutes (1 mark)
- Total dose of 3 microg/kg/day = 60 micrograms (1 mark)
- Divide dose between nostrils using atomizer (1 mark)
- Rapid onset (5 minutes)
- Consider alternative ongoing analgesics after second dose
- Not recommended <12 months of age

Part c (3 marks)

List three (3) non-pharmacological techniques for pain management that can be used in this patient.

Model Answer

From the list given in the chw guideline:

- Parental presence and comforting touch when possible
- Use distraction therapy eg video, music, toys, blowing bubbles, storytelling by the child, counting
- Engage child life therapist (play therapy) if available

Can only get one mark for distraction therapy components. Must be a specific

Question 17 (12 marks)

31yo female, 35/40 pregnant, presenting with a right sided unilateral headache for 3 days with 4 hour onset of right sided facial swelling, a red right eye and blurred vision. There is no history of trauma. She has past history of sinusitis for which she is on a Steroid nasal spray

Her vital signs are as follows:

RR	24
Sats	98% on room air
BP	100/60
HR	130
Temp	39.2°C
GCS	15

Your neurological examination reveals Partial ophthalmoplegia CNIII + CN V1 facial sensory loss + proptosis and chemosis all on the right side.

Part a (4 marks)

State the most likely diagnosis and your rationale for this.

Model Answer

- Cavernous Sinus thrombosis (CST):
- Rationale: Partial ophthalmoplegia CNIII + CN V1 facial sensory loss + proptosis and chemosis (increased pressure within cavernous sinus) = Cavernous Sinus Syndrome (CSS).
- CSS plus fever, tachycardia, hypotension = CST

Part b (2 marks)

List two (2) differentials that have an infective aetiology.

Model Answer

- Orbital cellulitis (headache and CN involvement suggests spread into cavernous sinus)
- Panophthalmitis
- Meningitis
- Septic embolus
- Sinusitis
- Shingles
- Other Infective: Inflammation/infiltration of meninges: - TB, sarcoid, lymphoma, syphilis

Part c (2 marks)

List two (2) differentials that have a non infective aetiology.

Model Answer

Other Causes of CN3 palsy

- Vascular: Infarction in brainstem or infarction nerve trunk from DM/HTN/SLE/GCA
- Aneurysm: PCA, basilar, cavernous sinus
- Tumour: Brainstem, Cavernous sinus, Supraorbital Fissure, Orbit
- Autoimmune: Demyelination: MS, GBS Miller Fischer variant

Other relevant causes of headache.

- Acute glaucoma

- Cluster headache
- Retroorbital collection/haematoma
- Preeclampsia (however not hypertensive)

Part d (4 marks)

State four (4) key prioritised management steps.

Model Answer

CST is a medical emergency requiring prompt and aggressive treatment:

- **Antibiotics:** Broad-spectrum
- **Anticoagulation:** controversial. And consider pregnancy
- **Corticosteroids:** May be used to reduce inflammation and swelling, especially if there are cranial nerve deficits.
- **Surgery:** If the underlying cause is sinusitis, surgical drainage of the infected sinuses may be necessary.
- **Supportive Care:** Pain management, fluids, and monitoring for complications.

Question 18 (12 marks)

A 35 yo obese female has been sent in by her ophthalmologist with suspicion of Idiopathic Intracranial Hypertension. She was noted to have papilledema bilaterally but no other abnormalities of her eye. Her CT and MRI show findings consistent with the suspected diagnosis.

Part a (2 marks)

You plan to perform an LP on this patient. What are the expected LP findings.

Model Answer

- Patients with IIH have a marked elevation in intracranial pressure (ICP; usually to 250 to 450 mm H₂O)
- normal CSF composition.

Part b (2 marks)

How would you position the patient for this procedure? State your rationale.

Model Answer

- Left decubitus. To be able to measure opening pressure.

Part c (2 marks)

You have both a Whitacre (pencil point) and Quincke (standard point) needle available. For each needle type, state in detail the relation of the needle tip to the patient to minimise post LP headache and your rationale.

Model Answer

- For Quincke, bevel of needle parallel to dural fibres (rather than perpendicular) – as it is a cutting needle. If patient in left decubitus, then bevel up.
- For Whitacre: no difference noted in in side port/eye positioning

Part d (2 marks)

State one (1) procedural intervention that can be performed which can reduce the headache if the diagnosis is Idiopathic Intracranial Hypertension. Include two (2) significant details about how this intervention is performed.

Model Answer

- One way to lower ICP in the ED is to drain CSF via lumbar puncture by removing 5- to 10-mL aliquots of CSF and checking ICP after each removal until a pressure lower than 200 mm H₂O is achieved.
- Normal CSF pressure is between 7 and 20 cm H₂O. Obese patients may have a CSF pressure of up to 25 cm H₂O

Part e (4 marks)

The patient returns a week later with ongoing severe headache. She has heard that an epidural blood patch can help with her headache.

List four (4) key points about this procedure.

Model Answer

- Usually done by anaesthetics or NSx
- Perform an epidural tap at the level of the previous lumbar puncture.
- Use the loss-of-resistance technique with sterile saline to locate the epidural space.
- Draw 10 to 20 mL of autologous blood into a syringe aseptically and slowly inject it (1 to 2 mL every 10 seconds) into the epidural space at the site of the dural puncture.
- Slow or discontinue the injection if back pain or paresthesia develops.
- Keep the patient supine for 1 hour while hydration is administered intravenously.
- Relief usually occurs within 20 to 30 minutes after the procedure.
- Epidural patches are less likely to be effective if symptoms have been present for more than 2 weeks.
- Pain is relieved when the blood patch forms a gelatinous tamponade that stops the CSF leak and immediately elevates CSF pressure.
- Patch failures (15% to 20%) are believed to be caused by improper needle placement, injection of an inadequate quantity of blood (after which a second patch is usually successful), or an incorrect diagnosis.

One mark for any of the above points to a maximum of 4 marks.

Question 19 (12 marks)

A 75 year old female who has been diagnosed with a left intracerebral haemorrhage is in your department. She has been admitted under the neurosurgical team and ongoing care plans have been discussed and agreed on by the patient and family. She has a GCS of 14 (E4M6V4) and is unable to swallow without aspiration. She needs a nasogastric tube placed for ongoing feeding.

Part a (4 marks)

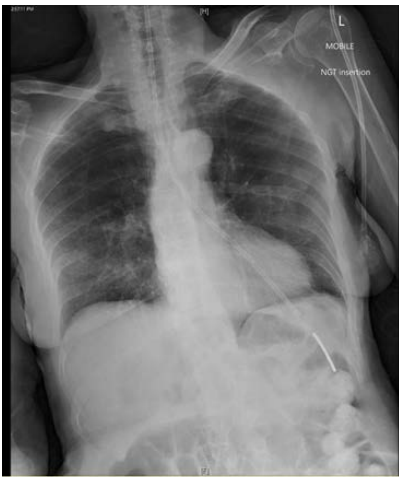
List four (4) reasons not to place the NG tube, with each indicate if this is a relative or an absolute contraindication .

Model Answer

- Absolute: oesophageal stricture (risk of oesophageal perforation) and basilar skull fracture or facial fracture due to the potential for intracranial misplacement, aortoenteric fistula
- Relative: oesophageal varices (may trigger variceal bleeding), bleeding diathesis, (severe bleeding).

Part b (3 marks)

There are no contraindications and an Xray has been performed after the tube has been placed.



State the main findings, your interpretation and plan.

Model Answer

- Findings: The NG tube is sharply angled to the left suggesting it is coursing in the left lobe bronchus.
- The tip is seen beyond the level of the left hemidiaphragm.
- Interpretation NGT not safe to use
- Plan: Urgent removal of NGT, Open disclosure.

Part c (5 marks)

State five (5) features of supportive and palliative care planning that would form part of your admission plan.

Model Answer

Use SPICt or other tool as per ACEM any 5 of those listed below:

- Review current treatment and medication so the patient receives optimal care.
- Consider referral for specialist assessment if symptoms or needs are complex and difficult to manage
- Agree current and future care goals/ plan with the patient and family.
- Plan ahead if the patient is at risk of loss of capacity.
- Handover: care plan, agreed levels of intervention, CPR status.
- Coordinate care (eg. with a primary care register). This is for informational purposes only.

Further features of supportive and palliative care planning that would form part of an admission plan:

- * Goals of Care: This section outlines the patient's overall goals for their care, focusing on comfort, quality of life, and what matters most to them.
- * Symptom Management: This addresses how to manage the patient's physical symptoms, such as pain, nausea, or shortness of breath. It includes medication protocols, non-pharmacological approaches, and how to escalate care if symptoms worsen.
- * Psychosocial and Spiritual Support: This section focuses on the patient's emotional, social, and spiritual well-being. It may include counseling, support groups, spiritual care, and addressing any existential concerns.
- * Advance Care Planning: This involves discussing and documenting the patient's wishes for future care, including decisions about life-sustaining treatments like CPR or mechanical ventilation. It may also involve appointing a healthcare proxy to make decisions on their behalf if they become unable to do so.
- * Discharge Planning: This outlines the plan for the patient's transition from the hospital to home or another care setting. It includes coordinating care with community providers, arranging for necessary equipment or supplies, and ensuring a smooth transition for the patient and their family.
- These features are essential for a comprehensive and patient-centered approach to supportive and palliative care.

Question 20 (12 marks)

You are the duty consultant working in a metropolitan emergency department. You have been asked to review a 50 year old female patient admitted to the ED observation unit. She is currently receiving a transfusion of cross-matched packed red blood cells for symptomatic anaemia secondary to menorrhagia. She has not previously required blood transfusion.

The transfusion started 30 minutes ago. The patient has since developed fever, tachycardia, dyspnoea and flank pain. Her vital signs are as follows:

HR	122
BP	98/67
SaO ₂	90% on room air
RR	24
Temp	38.9 °C
GCS	15

Part a (4 marks)

State the most likely explanation for the above scenario and list three (3) prioritised differentials. Provide your rationale for each choice.

Model Answer

1. AHTR (Acute Hemolytic Transfusion Reaction) most concerning possibility given the rapid onset, (1 mark)
2. other transfusion reactions (febrile non-hemolytic transfusion reaction, allergic reaction, transfusion associated sepsis), (1 mark for any of these)
3. TACO and TRALI unlikely as she has no history to suggest that these would occur. Half mark for either of these.
4. other causes of fever and systemic symptoms, should be considered. ACS, ongoing bleeding (one mark for any of these) However, the combination of fever, tachycardia, dyspnea, and flank pain strongly points towards AHTR.

Part b (4 marks)

State the blood investigations required for the ongoing management of this patient. Provide the rationale for your choices.

Model Answer

- Xmatch on patient and transfused unit ("wrong blood, wrong patient")
- Haemolysis work-up: FBC, LDH, bilirubin, haptoglobins, electrolytes, urinalysis (possible Acute haemolytic transfusion reaction)
- Sepsis work-up: blood cultures on patient and transfusion unit (possible Transfusion transmitted bacterial infection, blood contamination)
- DIC work-up: aPTT, PT, fibrinogen, d-dimer
- Tryptase (possible anaphylaxis)

Note; no marks for non- blood lx eg; • Chest XRay (possible TRALI, TACO) or • ECG (possible ACS)

Part c (4 marks)

You have been tasked with reviewing the policy on blood product administration.

List four (4) broad steps in this process.

Model Answer

Review of Policies and Procedures:

- Current Policy Review: Meticulously review the existing transfusion policy. Look for any ambiguities, inconsistencies, or outdated information.
- Best Practice Guidelines: Compare the current policy to best practice guidelines and recommendations from relevant organizations
- Gap Analysis: Identify any gaps between the current policy and best practice.
- Policy Revision: Revise the policy to address any identified gaps and to incorporate best practice recommendations. Ensure that the revised policy is clear, concise, and easy to follow.

4 steps in reviewing the departmental policy on blood transfusion in relation to this case..

- Identify scope of problem and stakeholders. See table below
- Benchmarking of targets
- Role of transfusion in short stay units
- Process of ordering blood and checking blood.

Multi-disciplinary stakeholders	Medical, nursing, transfusion service, clerical, porter (transport) staff.
Scoping	Identify current performance, and problem areas: eg labelling
Benchmarking/target	Industry or institutional. Establish targets.
Work with whole institution	Affected patients are often inpatients in ED
Environment	Optimise work environment: challenging with ED overcrowding, high demands etc, Appropriate labels and forms. Separate work areas to minimize wrong labelling. Easy access to forms, guidelines, advice: intranet, dedicated spaces
Processes / Policies	Strict criteria for form completions, tube labelling Dedicated forms for blood product prescription Incident reporting and monitoring system Hospital-wide clinical governance: eg working groups, committees
Staff training and credentialing	Particular challenge for new, junior and temporary staff Educational fora, intranet, web access

Review and revise

Report progress

Question 21 (12 marks)

A 33 year old female presents to your urban ED at 1am complaining of new left sided pelvic pain. She has associated nausea but no vomiting. She is sexually active, has no history of pregnancies or miscarriages and is uncertain when she last had her period. Her vital signs are:

RR	16
HR	102
BP	110/60
Sats	100% RA
Temp	37.1 °C

Blood results taken on arrival to your department show:

- Her beta HCG is * 940.0 IU/L (normal high <6 IU/L) and
- Her Progesterone is * 6.7 nmol/L

The lab reports the normal range for progesterone as:

Female follicular phase:	< 4.0 nmol/L
Female mid-cycle:	< 5.0 nmol/L
Female luteal phase:	2.0 - 90 nmol/L
First trimester pregnancy:	36 - 130 nmol/L
Second trimester pregnancy:	120 - 200 nmol/L
Third trimester pregnancy:	30 - 650 nmol/L

Part a (2 marks)

On being told that her blood test show positive for pregnancy, she is surprised but is keen to have an urgent ultrasound done.

State how the Beta HCG results provided are useful in guiding your response.

Model Answer

- Fast scan useful to identify free fluid if ruptured ectopic (beta HCG +ve)
- Will need TV scan to see pregnancy in uterus
- But only useful if Beta hCG >1500 (can be as low as 1000 depending on operator)

Part b (2 marks)

What is the role of ordering the progesterone level in this case?

Model Answer

- 20 to 60 nmol then 33% chance of ectopic if no us yet.
- Do this on a pregnancy where it is not confirmed if it is intra uterine or not
- If less than 20 then miscarriage most likely
- If greater than 60, then probably a viable pregnancy

Note; incorporation of this information into the decision making algorithm is dependent on the o+G service.

Part c (3 marks)

List three (3) additional prioritised laboratory investigations that you will perform. For each one state your rationale.

Model Answer

	Test	Justification
1	Urine FWT/dipstick	Leucocytes or nitrites suggest pyelonephritis/UTI
2	Bloods – FBE, CRP	Raised WCC and CRP support inflammatory or infective cause – CRP can be raised in torsion
3	Bloods – group & screen	If needing surgery and transfusion needed and for Rh status ; may need anti D

Part d (5 marks)

On examination she looks well, and is alert.

Her obs are unchanged from her initial obs at triage.

She has a soft abdomen with no signs of peritonism and mild discomfort on deep palpation of the left lower quadrant.

She would like to go home to get some sleep but would also like to know what happens next.

List the main points you would address in your discussion with her.

Model Answer

Advise to remain in hospital. Counsel re diagnosis of ectopic. Will need an ultrasound for formal diagnosis.

- could spontaneously resolve, or may req treatment
- risk of rupture and haemodynamic instability discussed
- treatment options would include expectant, medical and surgical mx
- counselled re risks and benefits of each option
 - o MTX - risks as per protocol, risk of ectopic/failure of procedure, 3 month washout period
 - o Dx lap - risk of normal tube on histopath, risk that salpingectomy not performed if tubes looks normal, other risks of surgery discussed
- Information sheet given to patient
- if patient had pain or became unwell, would recommend surgical management

Question 22 (12 marks)

You are in consultant in charge at a tertiary emergency department. The ambulance is bringing a 10 year old boy who fell off his scooter going down a ramp in a skate park. As he fell the handle bar hit his abdomen. He was not wearing a helmet and there a brief loss of consciousness. He was able to mobilise at the scene but has ongoing pain in his abdomen. He is afebrile with RR 25 HR of 110, BP 90/60 and GCS 13.

Part a (4 marks)

List four (4) priorities prior to arrival of patient.

Model Answer

- Trauma team activation
- Trauma team role allocation
- Notify other department – paediatric team, radiology, pathology
- Paediatric drug dose calculations
- Unlikely to need to intubate but prepare for this Prepare equipment/drugs specific to 10 yr child. (Weight (age +4) x2 = kg; Tube size (age/4)+4 in mm;
- Likely to need fluids; prepare equipment/drugs specific to 10 yr child. (Weight (age +4) x2 = 30 kg or age x 2 + 9 = 29kg); Fluid 20ml/kg bolus; U/S machine, analgesia

Part b (5 marks)

On arrival his airway is patent, he is no respiratory distress, HR 115, BP 85/60, GCS 15, and he has an abdominal injury as shown below.



List five (5) management priorities.

Model Answer

- Address circulatory compromise => prompt assessment abdo and pelvis, consider FAST. Consider fluid bolus 20ml/kg. ?further bolus, blood
- IV access
- Analgesia – consider route/doses
- Immediate investigations – bloods incl crossmatch
- Further imaging – CT – ultrasound if reasonable rationale given
- Inform parents of progress
- Notify surgeon if not already present..
- Blood at the urethral meatus suggestive of urethral trauma.
- Inspection of the back & perineum is essential, but needs to be explained and done calmly.
- PR or PV examination is rarely required, and simply traumatises the child. Should only be considered if evidence of trauma to the area.

- Consider TXA
- BP 85/60 'usual' BP for this age - SBP should be $70-80 + (2 \times \text{age})$ so in this 10 yo 90-100. To me, this BP in a patient with a GCS 15 doesn't scream 'MTP'

Part c (1 mark)

eFast is performed with one view being shown below. State one (1) relevant finding.



Model Answer

Finding: Free fluid in Hepatorenal angle (Morrisons pouch)

Part d (2 marks)

What is role of FAST in paediatric trauma cases?

Model Answer

The utility of FAST is controversial in the paediatric setting. This is because evaluation of the fluid volume present in the abdomen can be difficult and ultimately the presence of blood is not an indication for surgery. The need for a laparotomy in blunt abdominal trauma cases, as previously stated, relates largely to clinical response to aggressive resuscitation and the nature of the organs injured in the trauma.

(From RCH: <https://www.rch.org.au/trauma-service/manual/abdominal-injury/>)

A number of studies in haemodynamically stable children have found significant solid organ injuries (liver, spleen or kidney lacerations) on CT with normal bedside ultrasound. Whilst 22% of abdominal injuries in adults are not associated with free fluid this rises to 37% in children.

(From Don't Forget the Bubble: <https://dontforgetthebubbles.com/thinking-fast-and-slow/>)

However may still provide useful information => needs to be understood as adjunct to clinical examination with limitations rather than a trigger for surgery.

"FAST is controversial in paediatric trauma primarily because positive haemoperitoneum, even in the presence of a degree of haemodynamic instability, does not always lead to OT (in fact rarely does so). Splenic injury is usually managed conservatively. therefore, the decision about further course or imaging occurs irrespective, to a degree, of whether the FAST was positive or negative. knowing if there is free fluid in the abdo helpful - it just needs to be understood what it means. Of course knowing about presence/absence pneumothorax helpful. Technically FAST scanning on children easier because less depth to structures and typically less adipose tissue"

An answer which said positive FAST + hypotension = OT got 0/2.

No acknowledgement of this but an answer with some facts around FAST got 0.5-1/2.

Question 23 (12 marks)

A recent morbidity and mortality session reveals that that pelvic binders are not being used correctly in your department. You have been asked by your department director to write a policy on pelvic binder use.

Part a (2 marks)

State the rationale for pelvic binder use in the trauma patient.

Model Answer

- The **pelvic volume** is approximately 1.5L however, with pelvic ring disruptions this apparent space can accommodate the patient's entire blood volume
- Patients with pelvic fractures and haemodynamic instability have a high mortality rate of between 10-50% due to acute blood loss. **The majority of bleeding is secondary to venous loss from pelvic veins**, sacral plexus injury and/or bony injury.
- Arterial injury occurs in approximately 20% of haemodynamically unstable pelvic injury patients, often to the internal iliac artery.
- Must mention pelvic volume and venous bleeding control for 2 marks

Part b (4 marks)

List four (4) mechanisms by which the pelvic binder is thought to work.

Model Answer

1. 'Tamponade' bleeding by closing the pelvic space (**volume concept**)
2. Increase venous pressure to reduce venous bleeding (**vein compression concept**)
3. Minimise **movement** to prevent **clot disruption**
4. Reduce **pain** secondary to movement of fractured bone.

Must convey understanding of 4 separate concepts

Part c (4 marks)

List four (4) pelvic fracture patterns which are considered UNSTABLE (where the Pelvic Binder should be kept on until the definitive fixation or orthopaedic surgery consult is obtained).

Model Answer

- Lateral Compression (LC) - **LC2**: Iliac wing fracture/ **LC3**: Contralateral open-book injury (APC)
- Anterior-Posterior Compression (APC)- **APC2**: Widened SI joint with anterior ligament disruption/ **APC3**: Sacroiliac joint, anterior and posterior ligament disruption
- Vertical Shear (VS)- **VS**: Vertical displacement anteriorly and posteriorly, usually through SI joint
- Combined Mechanical (CM) - CM: **Combination** of other injury patterns: LC/ VS or LC/ APC
- Must mention one from each class for full marks

Part d (2 marks)

List two (2) pelvic fracture patterns that are considered STABLE (where the pelvic binder may generally be removed after review).

Model Answer

- Lateral Compression (LC) - **LC1**: Sacral compression on side of impact
- Anterior-Posterior Compression (APC) - **APC1**: Slight widening of pubic symphysis
- key words candidates need to use and summary for what they should do below:
 - a. Must mention pelvic volume and venous bleeding control for 2 marks
 - b. Must convey understanding of 4 separate concepts (tamponade, venous compression, clot disruption, pain control)
 - c. Can use short forms LC APC and VS and combination, but must mention one from each type for the full 4 marks
 - d. again, can use short form LC1 and APC 1 (note this is controversial)

Question 24 (12 marks)

A 63Yo Male has been sent to your urban emergency department with a raised troponin noted by his GP.

Part a (4 marks)

List four (4) ACUTE non ACS causes of elevated troponin.

Model Answer

- Acute elevation of troponin;
- Acute sepsis – reduced coronary perfusion
- Pulmonary embolism – Muscle stretch
- Stable coronary artery disease - with relative reduced perfusion
- Congestive CCF - reduced perfusion, stretch
- Inflammatory diseases e.g. pericarditis, myocarditis-muscle injury
- Aortic dissection- +/- coronary perfusion affected.

Chronic: no marks for these:

- Renal failure- decreased excretion
- Chronic heart disease.

Part b (4 marks)

List four (4) significant features of his ECG which is shown below.



Model Answer

- DeWinter T waves
- **Upsloping** ST depression in V2 to V5
- Tall T waves in chest leads V2 to V5
- Slight ST elevation aVR > 0.5mm

Part c (4 marks)

The patient had already taken aspirin (300mg orally) prior to presenting to the emergency department. You are considering dual antiplatelet therapy.

List four (4) clinical situations where Clopidogrel is used in preference to ticagrelor or prasugrel (apart from a known allergy or unavailability of either of these medications).

Model Answer

- Patient is being treated with thrombolytic therapy (you are at an urban hospital)
- has a separate indication for oral anticoagulation
- has a high or very high bleeding risk (eg a PRECISE-DAPT score of more than 25 or a HAS-BLED score of more than 3)

- has had prior intracranial haemorrhage or stroke, recent gastrointestinal bleeding or anaemia, or has a coagulopathy
- has liver failure, or severe kidney failure (estimated glomerular filtration rate [eGFR] less than 15 mL/min or requiring dialysis)
- is of extreme old age or frail.

The preferred P2Y₁₂ inhibitors for a patient undergoing PCI are ticagrelor and prasugrel; these have more rapid onset of action, less variable platelet inhibition, and better clinical outcomes than clopidogrel.

Clopidogrel is the only P2Y₁₂ inhibitor suitable for use with thrombolytic therapy. However, it is reasonable to switch treatment to ticagrelor after the initial loading dose of clopidogrel if desired; this should be considered in patients at high risk of recurrent events

Question 25 (12 marks)

A 25 year old female presents to your emergency department with a four day history of lower limb weakness. She has no other symptoms and is otherwise well.

Part a (2 marks)

List two (2) immediately life threatening causes of focal motor weakness which can be identified on blood investigations, and a relevant blood investigation you would order for each.

Model Answer

- hypoglycaemia: BSL
- periodic paralysis: K, Ca or Mg
- thyrotoxicosis (can cause periodic paralysis): TFTs
- Myositis: CK
- (NO2 toxicity – homocysteine levels?)

(cannot accept hypothyroidism TFTs/ anaemia/sepsis as these are generalised weakness)

Part b (3 marks)

You are most concerned that she has either Multiple sclerosis (MS) or Guillain-Barré syndrome (GBS).

List three (3) of the clinical features of GBS when examining the lower limbs that allow you to distinguish it from MS.

Model Answer

Feature (can have any of the below)	MS	GBS
Distribution	Asymmetrical, disparate, variable	Symmetrical ascending Glove and stocking
Fasciculations	no	Yes
Tone	spasticity	Flaccid
Plantar	Upgoing	Down going
Visual disturbances	Decreased vibrancy, optic neuritis	Diplopia – miller fisher variant
MM atrophy	None early	Severe
Reflexes	hyperreflexive	Reduced or absent
Autonomic	Yes – bladder dysfunction	Uncommon but instability is bad prognosis

Part c (4 marks)

On further history, you establish that she engages in Nitrous Oxide canister abuse. She admits to using ~180 bulbs daily for the last 6-8 weeks.

List four (4) organ systems that can be affected by Nitrous Oxide abuse and an associated sign OR symptom.

Model Answer

Full marks for the list below:

- **CNS – polyneuropathy, ataxia, hallucinations, muscle weakness, seizures etc.** (must have this for full marks)
- Psychiatric – mood swings, uncontrolled laughter/irritability/anger; grandiosity
- Respiratory – coughing, sneezing, wheezing, SOB, pneumothorax
- Hematologic effects – epistaxis, anaemia, megaloblastic anaemia, bone marrow suppression, B12 deficiency
- Reproductive effects – DNA damage, birth defects
- Skin – blistering near nose, mouth; facial rash/flushing
- GI – nausea, vomiting, diarrhoea
- Cardiovascular – tachycardia, cyanosis,

Part d (2 marks)

List two (2) medications that you could use to treat a patient with Nitrous Oxide toxicity.

Model Answer

- Active B12 1mg daily injection for 2 wks, follow by PO
- Methionine 1g PO TDS
- (-Encourage cessation of N2O- not a medication so not accepted)

Part e (1 mark)

What is the pathophysiology of peripheral neurological signs and symptoms in NO₂ toxicity?

Model Answer

Inactivation of vitamin B12 (a co-factor in methionine synthesis) leading to demyelination in the CNS and PNS.

The neurotoxicity of N₂O is due to its effects on vitamin B12. Vitamin B12 is a coenzyme of methionine synthase. Nitrous oxide converts vitamin B12 from the active monovalent form to the inactive bivalent form, thereby causing an irreversible inhibition of methionine synthase.

Methionine synthase is a ubiquitous cytosolic enzyme that plays a crucial role in the generation of methyl groups for the synthesis of DNA, RNA, and myelin, among other products. The clinical effects are similar to the subacute combined degeneration syndrome associated with pernicious anemia. Nitrous oxide is known to precipitate vitamin B12 deficiency when used on a chronic basis or acutely in patients with marginal stores of vitamin B12 such as the elderly or malnourished.

Question 26 (18 marks)

A novel avian influenza strain (H5N1) has been identified, and the World Health Organization has declared a pandemic. You have been allocated the disaster management portfolio for your emergency department.

Part a (3 marks)

List the three (3) main stages of an influenza pandemic; for each stage provide a brief description of its features.

Model Answer

- Interpandemic period
 - o No new influenza subtypes detected in humans
 - o No new influenza subtypes detected in humans but an animal variant threatens human disease
- Pandemic alert period
 - o Human infections - new subtype; no human-to-human spread
 - o Small clusters with limited human-to-human transmission
 - o Large clusters but human-to-human spread still localized
- Pandemic period
 - o Increased and sustained transmission in general population

From Cameron

Part b (4 marks)

List four (4) Triage and Infection Control Measures you would ensure were in place. For each choice provide a rationale.

Model Answer

Triage and Infection Control Measures:

- Dedicated Triage Area: Establish a separate triage area for patients with respiratory symptoms, away from general ED traffic, to minimize transmission. (1 mark)
- Rapid Triage Screening: Implement a rapid screening protocol for fever, cough, and shortness of breath at the ED entrance. (1 mark)
- Respiratory Symptom Zone: Designate a specific "respiratory symptom zone" within the ED, with negative pressure rooms or adequate ventilation, for isolating suspected cases. (1 mark)
- Personal Protective Equipment (PPE): Ensure adequate supplies of appropriate PPE (N95 masks, gowns, gloves, eye protection) are readily available and that staff are trained in their proper use. (1 mark)
- Hand Hygiene: Emphasize strict hand hygiene protocols for all staff and patients. (1 mark)
- Environmental Cleaning: Implement enhanced environmental cleaning and disinfection protocols, especially in high-touch areas. (1 mark)

Part c (3 marks)

State three (3) Strategies for Maintaining Emergency Department Capacity and for each choice, provide your rationale.

Model Answer

- Surge Capacity Planning: Implement surge capacity plans, including the use of alternate care areas and the rapid discharge of stable patients. (1 mark)
- Staffing Strategies: Develop flexible staffing strategies, including cross-training and the use of telehealth, to address potential staff shortages. (1 mark)
- Resource Management: Prioritize the use of critical resources, such as ventilators and ICU beds, based on clinical need. (1 mark)

Part d (4 marks)

State four (4) factors unique to a pandemic that have a detrimental impact on healthcare worker mental health.

Model Answer

- Risk of personal infection
- Greatly prolonged increase in workload
- Social isolation due to restrictions on travel and gatherings
- Uncertainty regarding duration and evolution of pandemic
- Moral injury

Part e (4 marks)

List two (2) Considerations for the Protection of Emergency Department Staff from the above concerns. For each of your choices, provide a rationale.

Model Answer

- Vaccination: Prioritise vaccination of healthcare workers against seasonal influenza and any available pandemic influenza vaccine. (1 mark)
- Psychological Support: Provide psychological support and counselling to staff to address the stress and anxiety associated with pandemic response. (1 mark)

Ref: Cameron and ACEM policies.

Question 27 (18 marks)

You are the senior ED clinician on as night shift begins in a rural hospital. A 28 year old lady presents with contractions. She is 35/40 gestation and has had normal antenatal care to date.

A midwife called by triage is already with the woman in the resuscitation bay and has applied CTG monitoring as ED nurses set up standard resus monitoring, cannulate and send bloods by the time you reach the resus bay.

Part a (3 marks)

State three (3) characteristics of a normal CTG.

Model Answer

1. Basal FHR 110-160ppm
2. Variability of FHR is between 6-25 bpm
3. Decelerations are absent or early

Examiners note: question is phrased to avoid the issue of the midwife making it to the patient rather than the patient making it to delivery suite.

foetal bradycardia < 110. Would be accepted as answer if number correct.

Accelerations are another way to talk about the variability, so if only mentioned as "accelerations" without numbers only scored 0.5 of a mark.

Describing what a CTG looks at (eg contractions) was not given a mark.

Decels are judged early if before peak contraction or late if after peak or after contraction.

Some candidates did not understand early Decels (decels that mirror the contraction) are OK

Part b (6 marks)

The midwife confirms she is in active labour with a fully dilated cervix.

State three (3) features of the situation that will influence your decision to have her deliver in ED or transfer her to delivery suite. Provide your rationale for each choice.

Model Answer

1. Midwife's assessment of imminence of delivery
2. Availability of staffing appropriate to imminent delivery in ED and in delivery suite for a predicted preterm delivery
3. Availability of staffing appropriate to resuscitation of a preterm neonate post delivery
4. Current state and activity within the Emergency department

The question specifically asked for factors influencing decision to transfer to delivery suite.

Many of the factors - while important to the delivery - would not influence the location.

This was more about considering the factors concerning where the patient should be delivered, and the safety of a transfer, not how tricky or complicated the delivery was likely to be.

Factors that mean this should be a delivery in the OT are not a reason to consider transfer to delivery suite.

Only half marks given if an answer does not make use of subspecialist (the midwife's) expertise in a situation where clearly a member of another subspecialty has over-riding experience. Eg by the midwife's determination of imminence of delivery, or making that decision in consultation with O+G (eg sample answer in 1.)

There should be some sort of assessment of available resources that takes into consideration the fact that there are two patients involved – the mother and the child, and that the child is pre-term but manageable for a period of time at a rural hospital.

Automatic failure of the question will result for an answer that implies the patient should be transferred to a larger centre before delivery.

One point to be awarded for some consideration of the situation outside of the immediate woman in the resus bay. This may come in many forms and will be leniently marked – just has to show the candidate has an understanding of the larger departmental / hospital situation. Could also include mention of pre-existing protocols for night time deliveries etc.

Part c (3 marks)

She delivers precipitously in ED. The on call obstetrician is still en-route to the hospital. The baby emerges well with Apgar's of 9 and 10, crying and vigorous and is handed to a resident with experience in paediatrics for ongoing care. However shortly after delivery of the child, the woman continues brisk PV bleeding with an estimated 1L of blood and ongoing bleeding.

Apart from uterine atony, list the three (3) most common underlying causes to consider in this situation.

Model Answer

- Trauma: laceration, rupture
- Tissue: retained tissue, blood clots, or placenta accreta spectrum (PAS)
- Thrombin: coagulopathy

Tone: uterine atony – no marks

Part d (6 marks)

List three (3) specific prioritised steps to take for the management of uterine atony in this clinical situation. State your rationale for each choice.

Model Answer

1. Deliver placenta
2. fundus rub
3. uterotonic administration e.g. syntocinon 10 iu IM/IV slow push and 40iu IV infusion or ergometrine 250ug IM/IV also reasonable to say "after placenta is delivered" or not.
4. IDC insertion

Prioritized Steps (Next Few Minutes):

1. Deliver placenta: uterus needs to contract to compress the blood vessels supplying placenta. Active management of the third stage of labor, which includes controlled cord traction and uterotonic administration, is a standard practice to facilitate placental delivery and minimize the risk of PPH
2. Fundal Massage and Uterotonic Administration (Simultaneous):
 - Action: Immediately begin vigorous fundal massage to stimulate uterine contraction. Administer uterotonic medications (e.g., oxytocin, misoprostol, tranexamic acid) as per local protocols.
 - Rationale: Uterine atony (failure of the uterus to contract) is the most common cause of PPH. Fundal massage and uterotonics are the first-line treatments to induce contraction and reduce bleeding. Tranexamic acid should be given within 3 hours of birth to reduce mortality.

3. Uterotonic medications options:

- Oxytocin/syntocinon: This is generally considered the first-line uterotonic.
 - o It stimulates uterine contractions, helping to compress blood vessels and reduce bleeding.
 - o It can be administered intravenously (IV) or intramuscularly (IM).
 - o It has a relatively good safety profile.
- Misoprostol: This is a prostaglandin E1 analog.
 - o It also causes uterine contractions.
 - o It can be administered orally, sublingually, rectally, or vaginally.
 - o It's particularly useful in resource-limited settings because it's heat-stable and doesn't require refrigeration.
 - o It can have side effects like shivering and fever.
- Carbetocin: This is a long-acting oxytocin analog.
 - o It provides sustained uterine contractions.
 - o It's administered as a single IM or IV dose.
 - o It is very effective, but can be more expensive than oxytocin.
- Ergometrine/Methylergometrine: These are ergot alkaloids.
 - o They cause strong, sustained uterine contractions.
 - o They can be administered IM or IV.
 - o They can raise blood pressure, so they're contraindicated in women with hypertension or pre-eclampsia.
- Prostaglandins (e.g., Carboprost): These are powerful uterotonics.
 - o They're used when other uterotonics are ineffective.
 - o They can cause significant side effects, such as nausea, vomiting, and diarrhea.

4. Bladder Catheterization:

- Action: Insert a Foley catheter to empty the bladder.
- Rationale: A full bladder can impede uterine contraction and exacerbate bleeding. Accurate urine output monitoring is also crucial for assessing renal perfusion.

Half marks if medications are listed without dosage, although dosage in ampoules or in consultation with midwife/O+G/look up in MIMS will be given full marks.

Question will be failed if an answer implies moving the woman to another location before stability / to theatre after arrival of staff capable of definitive management (eg to delivery suite)

misoprostol is recognised as a second line agent, so if a correct dose was listed and there was at least oxytocin listed then it received a mark. 1/2 mark if no oxytocin or no dose.

Question 28 (12 marks)

A 35yo female has been brought to your tertiary emergency department by a friend. Her friend states that the patient had fight with her ex partner who tried to strangle her.

Part a (4 marks)

List four (4) high risk features that can be elicited on history for this presentation.

Model Answer

- Mechanism – ligature strangulation may be more likely to produce vascular injury
- Loss of consciousness
- Incontinence
- History of seizures in the acute period Persistent headache
- Multiple episodes of non-fatal strangulation
- Head shaken
- Feet left the ground

Part b (4 marks)

List four (4) physical features (one each from separate body systems) that can be identified on examination which suggest a high risk injury.

Model Answer

- a. ENT
 - i. Pain, bruising or tenderness over carotid arteries
 - ii. Neck bruit
 - iii. Abnormal voice
 - iv. Stridor
 - v. Subcutaneous emphysema
 - vi. Loss of laryngeal crepitus (normal clicking sensation when laryngeal cartilages are moved laterally – no clicking implies swelling between laryngeal cartilage and vocal cords)
- b. Face
 - i. Petechiae of face, eyelids, palate or oral mucosa
 - ii. Subconjunctival haemorrhages
 - iii. Facial oedema
- c. Neurological
 - i. Focal neurological deficit
 - ii. Altered mental status
 - iii. Persistent restlessness, irritability or confusion
- d. Respiratory
 - i. Persistent hypoxia or tachypnoea

Part c (4 marks)

List four (4) inpatient teams (apart from the emergency department team and ICU) that you would consider involving. State a rationale for each team selected.

Model Answer

Neurology Consultation - is indicated for assessment of hypoxic injury, acute focal neurology with onset > 24 hours and to assist in assessing blunt carotid injury with or without focal signs. Neurology admission will depend on the detailed Neurology assessment and the patient's other complex needs.

Suspected or confirmed laryngeal injury – ENT for early nasendoscopy/laryngoscopy.

Vascular injury –vascular surgery consultation and potential admission where there is an isolated vascular injury without neurologic sequelae.

All patients – social work

Stroke Call - is only indicated if there was onset of focal stroke-like deficits within the last 24 hours. It is not indicated for altered level of consciousness, confusion or behavioural issues.

Other options resp and plastics.

No marks for ICU

Key traumatic complications requiring consideration on assessment include:

- Delayed anoxic encephalopathy
- Carotid artery dissection (with or without evidence of secondary embolic CVA)
- Larynx, hyoid or tracheal cartilage fracture
- Pharyngeal, laryngeal, supra or subglottic oedema
- Thyroid haemorrhage or storm
- Respiratory compromise due to negative pressure pulmonary oedema, neurogenic pulmonary oedema or aspiration
- Cervical spine injuries

Half marks for anaesthetics / trauma team/ gyn/ /sexual assault – forensic paed/ NSx

No marks for radiology or psychiatry or general medicine

Question 29 (12 marks)

53-year-old male presents with a large, warm, swollen, and extremely tender left knee. He is unable to weight bear or move the knee since last night when he was actively using intravenous drugs. There is a history of IVDU, previous left knee replacement (2021), and previous episodes of sepsis and wound cellulitis in the same knee.

His exam shows: Unwell appearance, flushed, ivdu injection site left cubital fossa; no cellulitis, limited ROM in the affected knee as he states the pain is severe. He is able to move his toes and ankle. Normal sensation to left lower limb and palpable dorsalis pedis and posterior tibial pulse. Your clinical suspicion is that he has a septic arthritis in a prosthetic joint.

Part a (4 marks)

List two (2) pros and two (2) cons of performing a knee aspiration in this patient.

Model Answer

Pros:

- **Definitive Diagnosis:** Aspiration and subsequent analysis of the synovial fluid is the gold standard for diagnosing prosthetic joint infection (PJI). It allows for:
 - o **Bacterial Culture:** Identifies the specific organism causing the infection, which is essential for targeted antibiotic therapy.
 - o **Cell Count and Differential:** Elevated white blood cell count, particularly neutrophils, strongly suggests infection.
 - o **Crystal Analysis:** Helps rule out other causes of joint inflammation, like gout or pseudogout (though less likely in the context of a prosthetic joint).
- **Guides Treatment:** Knowing the specific organism allows for tailored antibiotic therapy, maximizing the chances of successful treatment and minimizing the development of antibiotic resistance.
- **Reduces Unnecessary Surgery:** If the aspirate is negative for infection, it may help avoid unnecessary surgical intervention (like revision surgery).
- **May Provide Symptom Relief:** In some cases, aspirating a large effusion can provide temporary pain relief, although this is not the primary goal.

Cons:

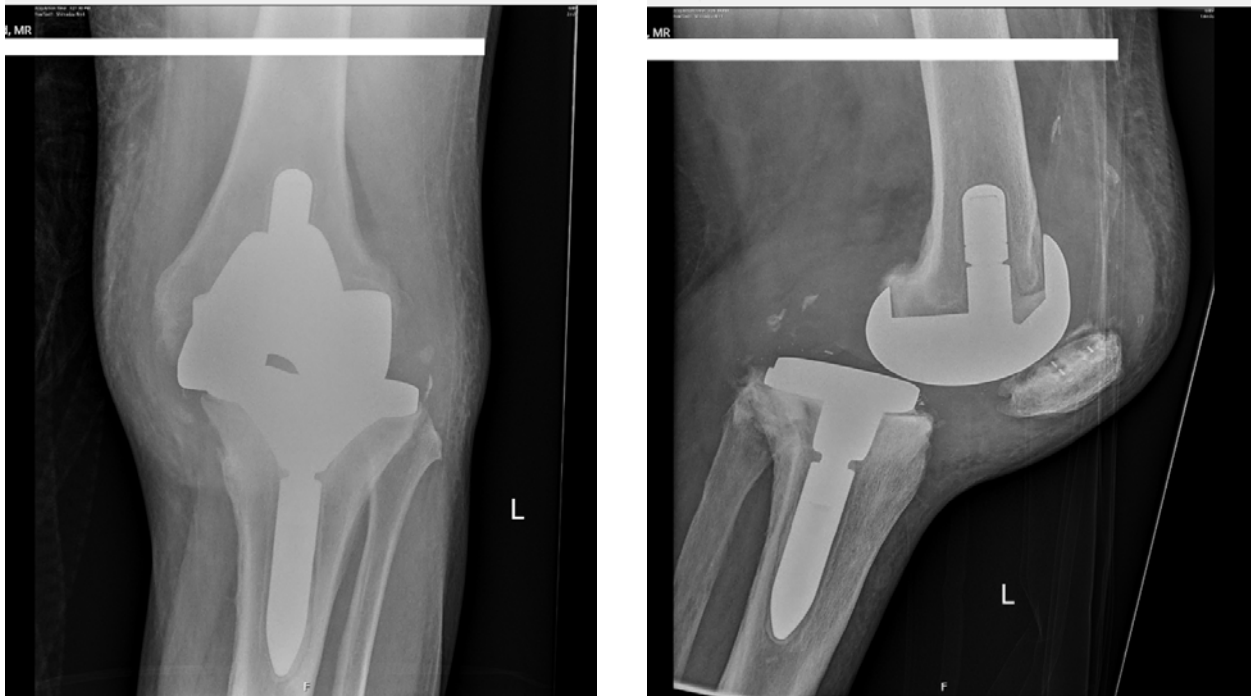
- **Risk of Introducing Infection:** While rare, there's a small risk of introducing a new infection into the joint during the aspiration procedure. Strict sterile technique is essential to minimize this risk.
- **False Negative Results:** Aspiration can sometimes yield a false negative result, especially if the patient has been recently treated with antibiotics (partially treated infection) or if the infection is localized and difficult to access with the needle. This can delay the correct diagnosis and treatment.
- **Discomfort:** The procedure can be painful, especially if there's a large effusion or significant inflammation. Local anesthetic is usually used to minimize discomfort.
- **Technical Challenges:** Aspirating a prosthetic knee can be technically challenging, especially if there's limited joint space or if the joint is scarred from previous surgeries. Usually need orthopedic surgeon or radiologist to perform.
- **Risk of Hemarthrosis:** There's a small risk of bleeding into the joint (hemarthrosis) after the aspiration, especially if the patient is on anticoagulants.

Overall:

The benefits of knee joint aspiration in a suspected PJI significantly outweigh the risks. It's an essential diagnostic procedure that provides critical information for guiding treatment and improving patient outcomes. However, it's important to be aware of the potential complications and to perform the procedure with meticulous sterile technique to minimize risks. If the initial aspiration is negative but clinical suspicion for PJI remains high, repeat aspiration or other diagnostic modalities (like imaging or intraoperative cultures) may be necessary.

Part b (3 marks)

The xray of his left knee has been performed and is shown below. State three (3) key features of this xray.



Model Answer

- The alignment of the left knee arthroplasty looks abnormal, and is dislocated.
- the tibia is posteriorly translated/subluxating relative to the femur with less than one third overlap of the articular surfaces.
- The polyethylene liner looks 180 degree rotated with the thicker component positioned posteriorly.
- There is a large knee joint effusion.
- There is near circumferential lucency at the bone metal interfaces of the tibia and femoral component.
- There is also lucency at the base of the patella plate and extensive component loosening and fibrous membrane formation is suspected.
- There is no bulky osteolysis.
- There is no periprosthetic fracture.

1 mark for any of the above features, but must mention that the joint is dislocated or subluxed to get full 3 marks.

Part c (5 marks)

State five (5) management priorities and provide a rationale for each choice.

Model Answer

1. Reduction: The primary goal is to reduce the dislocation as quickly and safely as possible. This is ideally done in the Emergency Department or operating room, often under sedation or anesthesia to relax the muscles and minimize pain. The method of reduction depends on the type of dislocation (tibiofemoral, patellar).
2. Assessment After Reduction: Crucial to assess for:
 - o Vascular injury: Popliteal artery injury is a major concern with knee dislocations. Check pulses (dorsalis pedis, posterior tibial), capillary refill, and ankle-brachial index (ABI). If there's any concern, immediate vascular surgery consultation is required. A CT angiogram (CTA) of the leg may be necessary.
 - o Nerve injury: Common peroneal nerve injury is also a concern. Check sensation on the dorsum of the foot and the ability to dorsiflex the foot (foot drop). Documenting this carefully is essential.
 - o Ligamentous injury: While difficult to assess fully in the acute setting, note any gross instability. MRI is usually deferred until after swelling subsides, but it will be necessary to fully evaluate ligamentous injuries (ACL, PCL, MCL, LCL).
 - o Fractures: X-rays are essential to identify any associated fractures. Knee dislocations are often associated with fractures.
3. Immobilization: Once reduced, the knee will be immobilized, usually in a hinged knee brace or a cast, depending on the stability of the joint and associated injuries.
4. Pain Management: Pain will be significant. Provide adequate analgesia, likely including opioids in the acute setting.

Further Management:

1. Orthopedic Consultation: Urgent orthopedic consultation is essential. They will manage the reduction, immobilization, and further evaluation and treatment of ligamentous injuries.
2. Imaging:
 - o X-rays: Pre- and post-reduction to assess for fractures and confirm proper alignment.
 - o MRI: Once swelling decreases, MRI will be needed to assess the extent of ligamentous and meniscal injuries. This will guide surgical planning.
3. Wound Care: If there are any open wounds associated with the dislocation, they will need to be cleaned and dressed appropriately.
4. Vascular and Nerve Monitoring: Close monitoring for vascular and nerve complications is essential, especially in the first 24-48 hours.
5. Rehabilitation: A structured rehabilitation program will be crucial after the initial healing phase. This will focus on regaining range of motion, strength, and stability.

How this Changes Things Compared to Septic Arthritis:

- Antibiotics: Unless there is a strong suspicion of infection (e.g., open wound, signs of systemic infection), antibiotics are not indicated for a simple knee dislocation. With septic arthritis, antibiotics are the cornerstone of treatment.
- Aspiration: Joint aspiration is not typically performed in a simple knee dislocation unless there is a large effusion and concern for hemarthrosis (blood in the joint) or other intra-articular injury. With septic arthritis, aspiration is essential for diagnosis.
- Focus: The focus shifts from infection control to reduction, stabilization, and assessment/management of associated injuries (ligaments, vessels, nerves).

1 mark for any of the above numbered points, but must mention BOTH joint reduction as a priority AND urgent vascular consult or vascular investigation to get full marks.