



Model Answers — NSW Practice SAQ Trial 2024.2

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Question 1 (12 marks)

A 75 year old female presents with right knee pain after falling from a 1.5 metre height. Her knee is extremely swollen.

Part a (4 marks)

Other than an inability to weight bear, list four (4) validated criteria for performing an X-ray in this patient.

Model Answer

- Age 55 or over
- Fibula head tenderness
- isolated patella tenderness
- Active knee flexion < 90 degrees

Part b (3 marks)

An AP X-ray of the patient's knee is provided below:



List three (3) abnormalities shown in this X-ray.

Model Answer

- Lateral knee dislocation
- Tibial plateau fracture
- Intra-articular extension

Part c (4 marks)

List four (4) acute complications of this injury.

Model Answer

- Popliteal artery (and vein) injury (35-40%)
- Peroneal nerve injury (25-30%)
- Compartment syndrome
- Amputation (80% chance if reduction is delayed >8 hours!!)

Part d (1 marks)

The knee is reduced under procedural sedation. A post procedure X-ray is obtained to ensure joint alignment.

What is the most important next investigation to perform in this patient?

Model Answer

- CT ANGIOGRAPHY (CT alone does not get mark)

Question 2 (12 marks)

A 40 year old female who is paraplegic presents to the emergency department. She reports a one day history of gradual onset headache and blurred vision.

Part a (3 marks)

Describe the pathophysiology of autonomic dysreflexia.

Model Answer

A serious, potentially life-threatening condition in patient with cord lesions **above the level of T6**. Caused by **sympathetic and parasympathetic hyperactivity** triggered by a **stimulus** below the level of the lesion.

(lesions lower than T6 usually do not cause serious cardiovascular complications because parasympathetic stimulation of the Greater Splanchnic nerve causes mesenteric vasodilation)

Part b (3 marks)

Name three (3) common triggers.

Model Answer

- **Urinary retention**
- **Constipation (should get at least one bold for full marks)**
- Pressure sores
- Fractures
- Cellulitis
- Renal calculi
- Others...

Part c (4 marks)

The patient has a systolic BP of 210 mmHg.

Outline your stepwise approach to the management of this patient.

Model Answer

- **Non-pharmacological:** sit patient up, loosen clothing
- **Pharmacological:** anti-hypertensive e.g. nifedipine 10mg PO, hydralazine 10mg IV, GTN (**need a specific drug and correct dose**)
- **Treat underlying cause** e.g. check IDC is not blocked or kinked, check skin for pressure sores

Part d (2 marks)

List two (2) complications of this condition.

Model Answer

- Arrhythmia/ Cardiac arrest
- Seizures
- Intracerebral haemorrhage
- Stroke

Part e (2 marks)

List two (2) different diagnoses for this presentation.

Model Answer

- Infection e.g. meningitis or encephalitis
- Intracerebral haemorrhage
- Malignant essential HTN
- Latrogenic medication OD or non-compliance
- Benign intracranial hypertension (IIH)
- Migraine
- Cerebral venous sinus thrombosis
- lots

Question 3 (12 marks)

A 25 year old female is brought in by ambulance with a reduced level of consciousness. On paramedic arrival the patient was initially agitated before becoming unconscious.

Her vital signs on arrival to ED are:

BP	100/60 mmHg
HR	70 bpm
SaO ₂	94 % in room air
RR	10 /min
GCS	7

Part a (3 marks)

Aside from toxic ingestions, list three (3) differential diagnoses for this patient.

Model Answer

- Infection - meningitis, encephalitis
- Metabolic - hypoglycaemia, hyponatraemia, thyroid storm
- Environmental - hyperthermia
- Structural - SAH, TBI, SOL

Part b (3 marks)

She wakes shortly after arrival and states she has taken 10 mls of GHB. She requests detoxification for GHB addiction.

List three (3) predictors of severe withdrawal.

Model Answer

- Short time intervals between dosing (≤ 2 to 4 hrs)
- Waking up during the night to dose
- Higher daily doses (> 30 g or 15mls GHB)

Part c (3 marks)

List three (3) signs of severe withdrawal from GHB.

Model Answer

- Disorientation
- Hallucinations/delirium
- Hyperthermia
- Hypertonia
- Seizures

Part d (3 marks)

List three (3) important pharmacological treatments and doses for her GHB withdrawal.

Model Answer

- Diazepam loading 20mg orally, then regularly every 1-2 hrs until a total of 60mg or light sedation, and then 10-20mg hourly to remain lightly sedated. Maximum of 120mg daily
- Baclofen 25mg tds
- Antipsychotics olanzapine 2.5-5mg (max 20mg daily) or quetiapine 25-50mg (max 200mg daily)
- Clonidine 75mcg (max 375mg daily) to manage features of sympathetic overactivity such as tachycardia, hypertension, tremor, restlessness
- Can give oral barbiturates in benzodiazepine resistant withdrawal- loading with phenobarbitone 30mg increments hourly up to maximum of 120mg or light sedation

Question 4 (12 marks)

You are working as the FACEM in a small regional ED when a 50 year old male presents with 48 hours of severe, generalised abdominal pain.

Pathology testing reveals a lipase of 850 IU/L.

Part a (3 marks)

List three (3) diagnostic criteria for pancreatitis.

Model Answer

- Lipase >3x upper limit of normal
- Characteristic abdominal pain
- Characteristic CT or USS findings

Part b (3 marks)

List three (3) disadvantages of lipase as a diagnostic marker for pancreatitis.

Model Answer

- Levels may be normal within four hours of onset
- Sensitivity is reduced in hyperlipidaemia
- Degree of elevation correlates poorly with disease severity

Do not accept 'low specificity' as close to 100% when >3x upper limit of normal

Part c (3 marks)

The patient rapidly becomes more unwell.

List three (3) early life-threatening complications of severe pancreatitis.

Model Answer

- Pancreatic haemorrhage
- Hypocalcaemia (accept associated ECG abnormalities)
- ARDS
- AKI
- Intravascular volume depletion/ 'third spacing' (do not accept 'vomiting' unless further detail)

Do not accept late complications – infection, portal vein thrombosis, pseudocyst

Part d (3 marks)

List three (3) CT features of acute pancreatitis.

Model Answer

- Enlargement of pancreas (focal or diffuse)
- Heterogenous density due to oedema or necrosis
- Indistinct margins due to inflammation
- Peri-pancreatic high-attenuation fluid (accept haemorrhage)
- Retroperitoneal fat stranding
- Presence of gas (emphysematous pancreatitis - suggests infected necrosis)
- Presence of gall stones

Question 5 (12 marks)

An 8 year old male presents to your tertiary level hospital ED with a limp.

Part a (6 marks)

List six (6) red flags that would suggest a non-benign cause for this patient's pain.

Model Answer

- Severe localised joint pain (should raise suspicion for septic arthritis)
- Suspicion of NAI - eg. multiple injuries of different age
- Persistent symptoms >7 days
- Nocturnal symptoms
- Suspicion for malignancy - constitutional symptoms - weight loss, anorexia, fatigue
- Systemic features (eg. fever, weight loss, lethargy/easy fatigue, anorexia, fevers, night sweats)
- Change to urinary or bowel habit
- Petechiae or purpura - consider HSP, haematological cause, malignancy
- Complete inability to walk/weight bear may indicate significant pathology

Part b (2 marks)

He has hip pain.

List four (4) likely differential diagnoses.

Model Answer

- Transient synovitis
- Acute myositis
- Septic arthritis (other infective causes such as osteomyelitis)
- Perthes disease
- Developmental dysplasia of the hip
- Trauma – stress fracture
- NAI
- Malignancy (bone or soft tissue)
- Rheumatological – reactive, juvenile arthritis, HSP, vasculitis, serum sickness, post-infective, GBS
- Surgical causes - torsion/ appendicitis

Part c (4 marks)

List the four (4) features of the Kocher criteria.

Model Answer

In a child with hip pain, presence of the following 4 criteria increase the likelihood of septic arthritis:

- Temp > 38.5 °C
- Non-weight bearing
- Leucocytosis >12 x 10⁹/L
- ESR > 40mm/h or CRP > 20mg/L

0 criteria = very low

1 = low

2 = moderate

3-4 = very high

Question 6 (12 marks)

A 55 year old represents to your ED with dyspnoea following review by an intern on night shift 3 days earlier. The patient is dissatisfied with their previous review, feeling prematurely dismissed and stating that their doctor was incompetent.

Further investigations diagnose a PE, and the patient now wishes to make a formal complaint.

Part a (4 marks)

How would you respond to this patient?

Model Answer

- **Apologise using principles of open disclosure** (apology with expression of regret, factual explanation, give the opportunity for patient to relate experience, discussion of potential consequences, explanation of what's being done)
- Verbal de-escalation if necessary (introduce self, build rapport, gain understanding, realign expectations)
- Assure the patient you will review and investigate the case and interview the staff involved, report get back to patient
- Advise them of the formal complaint process

Part b (4 marks)

What steps would you take to investigate this incident?

Model Answer

- Review the patient notes and medication chart
- Interview the JMO and other staff involved
- Check levels of supervision, what issues contributed to the complaint/misdiagnosis
- Speak to the person supervising the JMO on shift? Did they review the patient
- Inform the JMO supervisor to put into perspective with JMOs overall performance
- Inform the department director
- Log incident using incident management software

Part c (4 marks)

You review the intern's notes to find brief documentation that is not representative of the verbal history given to their registrar. Feedback from others is that the intern can be dismissive and difficult.

How would you manage this junior doctor?

Model Answer

- Formulate a plan with the JMO supervisor that includes:
- Meeting with the JMO to advise them on the findings of the investigation
- **Check on JMO wellbeing** – offer support - suggest HR, EAP, GP, DPET - check if they need time off work, ask for their feedback about what would be helpful for them to improve
- Formulate a performance management plan with specific learning goals for trainee and a clear timeline for review of progress
- Review shift supervision – consider taking intern off nights, make sure all seniors they work with are aware of IPAP/learning needs
- **Maintain patient safety at all times** - if evidence for dangerous conduct then step down until further investigation/plan
- Advise that they might want to seek advice from MDO
- Plan for review a set date to check if learning goals being satisfied

- ACEM Remediation of a poorly performing practitioner policy:
 - Find a mentor
 - Assign a supervisor
 - Appropriate time frame for remediation
 - Have a **performance management plan**:
 - o **Specific aims:** courses, upskilling, required and desired outcomes
 - o Duration of program (3 months minimum)
 - o Supervision arrangements (degree and nature, timetable for review)
 - o Present plan in writing

Question 7 (12 marks)

A 50 year old male presents with fevers, flank pain, dysuria. Has had a history of renal stones in the past.

Part a (3 marks)

List three (3) risk factors for renal calculi.

Model Answer

- Recurrent UTI
- Hyperuricaemia
- Hypercalcaemia
- Congenital malformation such as bifid ureters, PCD, horseshoe kidney
- Drugs such as carbonic anhydrase inhibitors, calcium, vitamin D
- Genetic – cystic fibrosis
- RTA

Part b (5 marks)

The patient is in an acute bed with full cardiorespiratory monitoring.

CT KUB shows a large obstructive proximal stone.

His vital signs are below:

HR	130 bpm
BP	90/50 mmHg
RR	20 /min
SaO ₂	98 % in room air
Temp	39.5 °C

UA – leucocytes ++, Nitrites ++, Large blood

What is your immediate management?

Model Answer

- Identify this is a urological emergency – **urgent urology referral for potential renal decompression** as most likely diagnosis is infected obstructed renal stone
- Specific – IV **antibiotics** IV ampicillin 2g and 5-7mg/kg gentamycin
- Supportive – **IV Fluids** - normal saline 0.9% 10 – 20mls/kg bolus to maintain a MAP of 65mmHg, consider vasopressors if not fluid responsive
- **Analgesia** – indomethacin 100mg PR, Fentanyl 25mcg titrated to cessation of pain
- Disposition – Theatre for urgent ureteric stent and ICU admission under the urology team

Part c (2 marks)

Other than an infected renal stone, list four (4) criteria for urology admission when a patient has a confirmed renal stone.

Model Answer

- Large proximal stone (> 5mm)
- Bilateral ureteric stones
- Significant renal impairment

- Multiple or persistent repetitive episodes of pain requiring parenteral analgesia
- Renal transplant patients

Part d (2 marks)

Your registrar has called the urology registrar multiple time given this is a urological emergency however they are not answering their pager, instead the RMO answered and said the registrar is scrubbed and will not take any calls.

How will you manage this situation?

Model Answer

- Call theatres and ask to speak to the registrar via speaker to make them aware of the unstable patient in ED
- Call the oncall urology consultant to escalate that the registrar is stuck in theatre and cannot take calls
- IIMS – for delay in treatment for the patient and to look into how to improve the system of having one registrar oncall when stuck in theatre

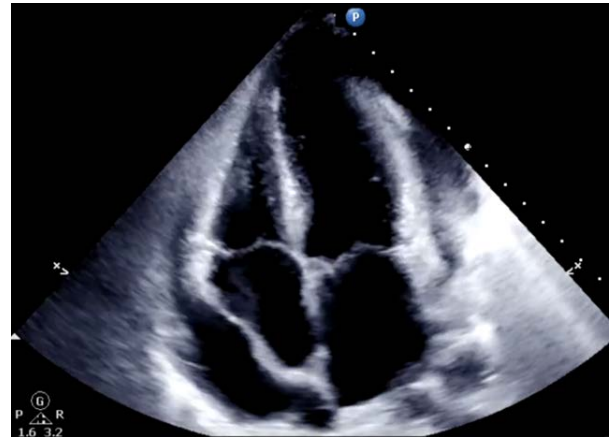
Question 8 (12 marks)

A 70 year old male presents following a collapse. He arrives in your tertiary ED and undergoes a rapid bedside ultrasound.

His vital signs are:

BP 70/40 mmHg

HR 120 bpm



Part a (3 marks)

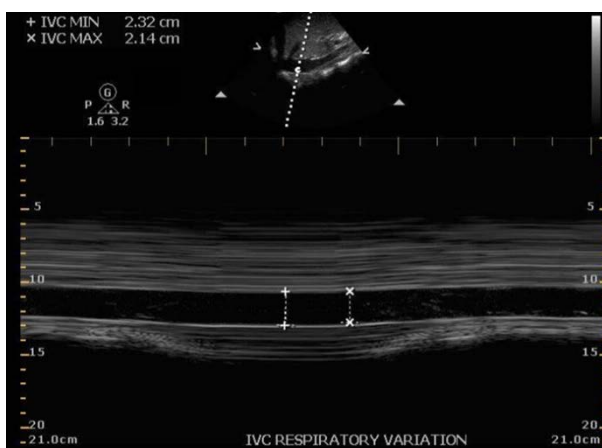
Describe and interpret the above images.

Model Answer

- Subcostal view **pericardial fluid with RV collapse**
- Apical 4 chamber view with **RA collapse** (in systole) (MV and TV closed - systole)
- **Pericardial tamponade**

Part b (3 marks)

A third image is obtained.



Describe this image and what ultrasonographic changes are shown. Is the change consistent with the above diagnosis and why?

Model Answer

- M mode IVC subcostal in the sagittal view

- There is a **plethoric IVC (more than 2.1 cm)**
- Associated **minimal (< 50%) respiratory variation**
- Consistent with cardiac tamponade as the **right atrial filling is impaired and blood backs up into the IVC**

Part c (3 marks)

The Registrar you are supervising asks you about McConnell's sign.

Describe McConnell's sign and state its significance in a patient who presents with collapse and hypotension.

Model Answer

- Defined as **right ventricular free wall akinesis** with **sparing of the apex**
- Highly suggestive of **acute PE**

Part d (3 marks)

List three (3) non-traumatic causes of acute pericardial effusion causing tamponade.

Model Answer

- Type A aortic dissection
- Post cardiac surgery (more common in valvular surgery)
- Cardiac rupture (presents as PEA)

Question 9 (12 marks)

A 35 year old female who is 34 weeks gestation (G2P1) presents to your metropolitan emergency department with sudden onset breathlessness, chest pain and a feeling of impending doom. She has no known medical history. Her pregnancy has been uncomplicated until now.

Her vital signs are as follows:

HR	130 bpm
BP	85/60 mmHg
RR	30 /min
SaO ₂	86 % in room air, 90 % on 15 L via NRBM

Part a (5 marks)

List five (5) potential differential diagnoses for her presentation.

Model Answer

- Massive PE, amniotic fluid embolism
- AMI
- Aortic dissection
- Severe pre-eclampsia with pulmonary oedema
- Peripartum cardiomyopathy
- Pneumonia with septic shock

Part b (5 marks)

List five (5) airway and ventilation issues you could anticipate when attempting to intubate this female.

Model Answer

- **Increased risk of aspiration** – due to decreased lower oesophageal sphincter tone, increased abdominal pressure, decreased gastric emptying.
- **More oedematous airways** – tongue and supraglottic airways oedematous, and more friable (therefore more likely to bleed and swell) (may need to use smaller ETT)
- **Decreased FRC and increased O₂ consumption** – develop hypoxia more quickly, less tolerant of apnoeic periods.
- **Mask ventilation more difficult** due to low FRC, elevated diaphragms, and raised intraabdominal pressure.
- **Obesity** relatively common in pregnancy, causing relative neck extension when supine (causing greater anterior placement of larynx). Also shorter neck in obese gravid women
- **Large breasts**, causing difficult laryngoscopy

Part c (2 marks)

What are the indications for a perimortem caesarean section?

Model Answer

- Maternal arrest within 4 minutes (some references state up to 10 minutes)
AND
- > 24/40 gestation (Alternatively use fundal height above umbilicus or “visibly pregnant” as a good rough guide)

Question 10 (18 marks)

You are the consultant in charge of a rural emergency department 200 km from the nearest tertiary referral hospital. Your hospital has no subspecialty surgical capabilities or MRI.

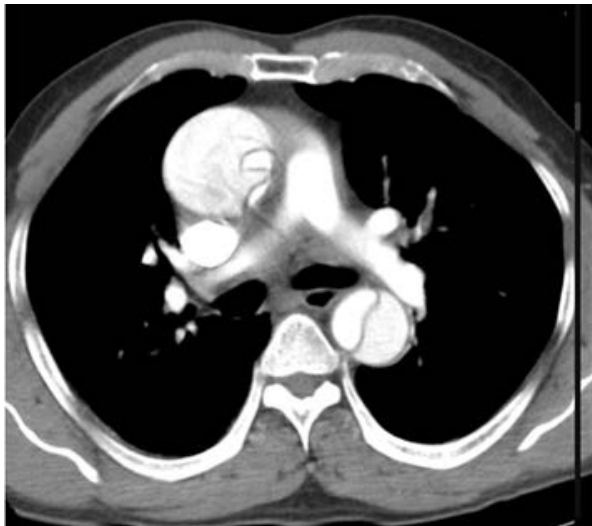
A 63 year old male presents with a 1 day history of sharp retrosternal and intra-scapular pain. He reports leg weakness and unsteadiness on his feet. He takes aspirin and candesartan daily.

Vital signs:

HR	118 bpm
BP	186/97 mmHg (equal both arms)
RR	24 /min
SaO ₂	97 % in room air
Temp	36.8 °C
GCS	15

His upper limb pulses are normal with weak popliteal and pedal pulses. Bilateral lower limb power is 3/5 with brisk knee and ankle jerk reflexes. He has decreased sensation to both lower limbs.

A CT Aortogram has been performed.



Part a (1 mark)

Using an appropriate classification system describe the most significant finding of the CT Aortogram.

Model Answer

- DeBakey I aortic dissection
- Stanford Type A aortic dissection

Part b (5 marks)

List five (5) complications that you are concerned about for this patient.

Model Answer

- Must say spinal cord ischemia
- Dissection into carotids, coronaries, mesenteric, renal, limbs with ischemia

- Pericardial tamponade
- Aortic regurgitation
- Free rupture, haemothorax, exsanguination
- Horner's syndrome
- Aneurysm formation

Part c (6 marks)

He is in the resuscitation bay with full cardiorespiratory monitoring.

List your management priorities for this patient including end points where appropriate.

Model Answer

- **Analgesia** – appropriate agents and doses
- **HR control to prevent reflex tachycardia (Target HR 60-80)**
 - Labetalol 10-20mg IV q5-10min (infusion 20-60mg/hr)
 - Metoprolol 1-5mg IV q5
 - Esmolol IV loading dose 500mcg/kg over 1min (infusion 50-200mcg/kg/min)
 - Propranolol 1-3mg IV q5min
- **BP Control (Target SBP 100-120)**
 - Hydralazine 5-10mg IV q15-20min
 - GTN infusion 10mcg/min, increase every 5min by 3-5mcg/min as required
 - Nitroprusside infusion 0.25mcg/kg/min, increase every 2-3min to a maximum of 10mcg/kg/min
- Needs **definitive surgical Mx** at a CTS and spinal centre - operative
- Invasive BP monitoring

Part d (6 marks)

The patient is subsequently transferred to a tertiary centre.

List three (3) advantages and three (3) disadvantages of rotary wing retrieval for this patient.

Model Answer

- **ADVANTAGES:**
 - Usually fastest/most appropriate retrieval platform 100-350km (this patient needs to go 200km)
 - Allows point to point transfer if both hospitals have a helipad (avoids double handling patient)
 - Response is not traffic dependent
- **DISADVANTAGES:**
 - Medical interventions are difficult in-flight
 - Noise, vibration, G-forces – may exacerbate pain/alter haemodynamics/etc
 - Motion sickness
 - Unstable temperature
 - Not pressurised - Low air pressure/partial pressure of O2 at altitude
 - Restricted by weather and landing sites
 - Expensive

Question 11 (12 marks)

A 7 day old male is brought to your tertiary ED with a 24 hr history of poor feeding and increased work of breathing. You suspect congenital cardiac disease.

Part a (4 marks)

List four (4) potential cardiac lesions in this child.

Model Answer

- Most common lesions presenting in the first week of life (must include at least 2 of these):
 - Critical aortic stenosis
 - Coarctation of the aorta
 - Large VSD
 - AVSD
 - Truncus arteriosus
- Others less common at this age:
 - TGV
 - TAPVC
 - Hypoplastic left heart syndrome
 - TOF
 - Tricuspid atresia
 - Pulmonary atresia

Part b (2 marks)

His saturations are 85 % in room air. You decide to perform a paediatric hyperoxia test and measure SpO₂ after 15 minutes of 100 % oxygen.

Complete the following table.

Model Answer

Saturations post test	Interpretation
88%	Intracardiac shunt Cyanotic congenital heart defect
96%	Pulmonary disease CNS disorders Methaemoglobinaemia

Explanation from CAMERON: measure SpO₂ on room air or low FiO₂. Remeasure SpO₂ after 15 min of 100% O₂. If SpO₂ remains low, consider fixed intracardiac shunt (cyanotic congenital heart disease). Most cyanotic congenital heart disease have a PaO₂ <60. If SpO₂ increases, consider other causes e.g. lung disease. PaO₂ >150 almost excluded cyanotic CHD entirely

Part c (3 marks)

A prostaglandin E1 infusion is commenced.

List three (3) potential side effects.

Model Answer

- Apnoeas
- Hypotension
- Hypoglycaemia
- Seizures

- Flushing
- Transient hyperthermia
- Tachycardia
- Bradycardia

Part d (3 marks)

The child was accidentally administered a dose of prostaglandin E1 ten times stronger than intended.

Describe three (3) strategies to mitigate risk in the ED.

Model Answer

- Double checking medication
- Clinical performance monitoring e.g. M&M
- Regular teaching/ paediatric simulation sessions
- Document templates (eg online NETS calculator)
- Policy development and review

Question 12 (18 marks)

You are the ED consultant in charge at a major trauma centre. A 22 year old male is brought in by ambulance with stab wounds to the left chest, back and right flank. He was stabbed by a home intruder approximately 30 minutes prior. The patient's flat mate was also stabbed and the paramedics state that he is also unstable and will be arriving at your ED in ten minutes.

His vital signs are:

HR	130 bpm
BP	80/42 mmHg
RR	35 /min
SaO ₂	91% on NRB mask
GCS	13 (E3, V4, M6) groaning in pain
Temp	34.6 °C

The paramedics have placed large bore IV cannulas in each antecubital fossa and administered 500 mls IV Hartmann's. They have noted poor chest expansion on the left with decreased breath sounds on auscultation.

Part a (7 marks)

State seven (7) priorities you have for managing this situation.

Model Answer

- Major Trauma activation (Must mention 2 patients)
- Finger decompression and/or chest drain
- Stop catastrophic haemorrhage
- MTP activation and balanced / ROTEM guided transfusion
- Potentially Code Crimson if still unstable post chest decompression
- Many other reasonable answers
- Active warming

Part b (3 marks)

You perform an eFAST as part of your assessment which is positive for intra-abdominal free fluid. He remains hypotensive despite initial resuscitation.

List three (3) **other** indications for an urgent laparotomy in the context of abdominal trauma (blunt or penetrating).

Model Answer

- Peritonism
- Pneumoperitoneum/Free air under the diaphragm
- Significant gastrointestinal haemorrhage
- High grade solid organ injuries if embolisation not available
- Penetrating abdominal trauma + hypotension
- Evisceration
- GSW traversing peritoneum

Part c (4 marks)

Despite your resuscitation measures, the patient loses cardiac output.

List four (4) therapeutic measures you can perform as part of an ED thoracotomy.

Model Answer

- Release pericardial tamponade
- Suture/staple cardiac laceration
- Compress/clamp descending aorta
- Hilar twist or clamp hilum
- Internal cardiac massage
- Internal cardiac defibrillation

Part d (4 marks)

List four (4) contraindications to performing an ED thoracotomy.

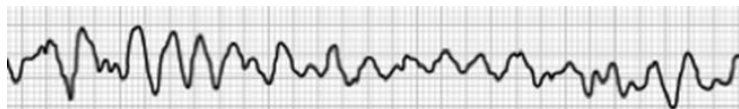
Model Answer

- Asystole on arrival
- No signs of life prehospital
- Cardiac arrest/loss of output > 10 or 15 mins acceptable (ACI/Dunn = 10 mins)
- Non-survivable head injury
- No access to definitive surgical interventions
- Higher calibre bullet injuries (Dunn)
- Blunt trauma without signs of tamponade (Dunn)
- Multiple wounds (relative) (Dunn)

Question 13 (12 marks)

A 54 year old male self presents to ED looking pale and sweaty and complaining of chest pain. He is taken straight to a resus bay. While he is being changed into a hospital gown and connected to monitoring, he collapses on the bed and is unresponsive.

The monitor shows this rhythm.



Part a (2 marks)

As per current Australian Resuscitation Council Guidelines, what are the criteria for considering a precordial thump?

Model Answer

Monitored and witnessed to go into Pulseness ventricular tachycardia
AND
A defibrillator not immediately available

Part b (2 marks)

As per current Australian Resuscitation Council Guidelines, when are “three-stacked shocks” appropriate?

Model Answer

Monitored and witnessed to go into ventricular fibrillation
Connected to defibrillator, or first shock able to be administered within 20 seconds

Part c (2 marks)

This patient is attached to the defibrillator while chest compressions are commenced.

The correct rate and depth of chest compressions are:

Model Answer

Rate = 100 – 120 /min
1/3 depth of the chest

Part d (1 mark)

A shock at maximum joules has been administered and chest compressions recommenced. Meanwhile, the patient has been successfully intubated, so chest compressions are continuous.

The correct ventilation rate in this situation is:

Model Answer

6 – 10 breaths/min

Part e (3 marks)

List three (3) reasons why hyperventilation in ALS is harmful.

Model Answer

- Raised intrathoracic pressure impedes venous return
- Raised intrathoracic pressure impedes coronary blood flow

- Increases impedance to defibrillation
- Potential for barotrauma

Part f (2 marks)

The arrest is thought to most likely be because of an acute myocardial infarction. The patient remains in ventricular fibrillation.

List two (2) management options for this patient.

Model Answer

- Going to angiography suite with chest compressions continuing
- Thrombolysis in ED
- Going onto ECMO and transferring to angiography suite on ECMO

Question 14 (12 marks)

An 82 year old female is brought to your tertiary Emergency Department on the third day of a heat wave with an altered level of consciousness.

Her observations on arrival are:

PR	98 bpm
BP	86/54 mmHg
Core Temp	42.3 °C
SaO ₂	94 % in room air
GCS	12/15

Part a (4 marks)

Aside from heat stroke, list four (4) differential diagnoses in this case.

Model Answer

- NMS
- Malignant hyperthermia
- Sepsis
- Thyroid storm
- Serotonin syndrome
- Sympathomimetic toxicity

Must mention sepsis for full marks. If only lists toxidromes can only score maximum of 2 marks

Part b (4 marks)

List four (4) risk factors for the development of heat wave related deaths.

Model Answer

- Bed bound
- Not able to leave home daily
- Pre existing mental health issues
- Pre existing pulmonary disease
- Pre existing cardiovascular disease
- Being unable to care for self
- Extremes of age

Part c (4 marks)

Complete the following table listing the rate of cooling for each named modality.

Model Answer

Cooling Modality	Rate of Cooling per minute (°C)
Ice Packs to Groin/Axilla/Neck	0.04 - 0.08
Evaporative spraying	0.31
Cold Water Immersion	0.15 - 0.24
Peritoneal Lavage	0.56

Question 15 (12 marks)

A 46 year old male is brought in by paramedics who has been actively seizing for 15 minutes. He has had 5 mg of IM midazolam with no effect.

His vital signs are:

HR	121 bpm
BP	146/98 mmHg
RR	26 /min
SaO ₂	94 % on 15 L NRB
Temp	37.6 °C

Part a (1 mark)

What is the definition of status epilepticus?

Model Answer

- Continuous seizure activity for 5 minutes or more
- 2 or more consecutive seizures without full recovery between seizures
- (Older/traditional definitions require 30 minutes of continuous seizure activity – do not award a mark for this response)

Part b (6 marks)

Outline your stepwise management of this patient.

Model Answer

- Airway management/ensure patency, careful suctioning of secretions, supplemental O₂
- Lateral positioning, pillows, bed rails up
- 1st line anticonvulsants (one further dose)
 - Midazolam 5-10mg (0.2mg/kg) IV/IM
 - Diazepam 10-20mg (0.1-0.3mg/kg) IV
 - Lorazepam 0.1mg/kg IV
 - Clonazepam 1-2mg IV
- 2nd line anticonvulsant – administer even if seizure terminates with benzodiazepines, as the anticonvulsant effect of the benzos will only last 20-30min
 - Levetiracetam 40mg/kg up to 4.5g IV over 15 min
 - Sodium valproate 20mg/kg up to 3g IV over 3-5 min followed by infusion
 - Phenytoin 15-20mg/kg at <50mg/min
- 3rd line anticonvulsant – for refractory status epilepticus not responding to second line agent/agents
 - Rapid sequence induction
 - Propofol 2-3mg/kg then <4mg/kg/hr
 - Phenobarbitone 10mg/kg IV bolus then 0.2-0.4mg/kg/min infusion
 - Thiopentone 4mg/kg IV boluses (or infusion)
- Seek and treat the cause of the seizures e.g. hypoglycaemia, hyponatraemia, infection, raised ICP, drug over dose

Part c (5 marks)

List five (5) complications of status epilepticus that you are concerned about for this patient.

Model Answer

- Aspiration / respiratory failure
- Neurogenic APO
- Rhabdomyolysis
- DIC
- Trauma – head injury, posterior shoulder dislocations
- Hyperthermia
- Todd's paralysis
- Heart failure/arrhythmia
- Brain damage – cerebral oedema, widespread neuronal necrosis, cognitive dysfunction

Question 16 (12 marks)

A 4 year old female presents with a petechial rash to the lower limbs. You suspect Haemolytic Uraemic Syndrome.

Part a (6 marks)

List six (6) other differential diagnoses.

Model Answer

- Bacterial – **Neisseria meningitides**, strep pneumoniae, haemophilus, group A strep
- Viral – enterovirus, adenovirus, influenza, CMV, EBV
- Mechanical – NAI, coughing/vomiting (not relevant to this case)
- Haematological – ITP, malignancy e.g. leukaemia, aplastic anaemia, DIC
- Other – Henoch-Schonlein purpura, vasculitis, drug-induced thrombocytopenia

Part b (4 marks)

A haemolysis screen is performed.

List two (2) components of this test and the expected findings in HUS. An example is provided. Reference ranges are not required.

Model Answer

- Bilirubin – high unconjugated
- Haptoglobin – low
- LDH – elevated
- Blood film – schistocytes
- Reticulocytes – elevated
- Coomb's test (DAT) – positive
- Plasma free Hb – elevated

NB FBC is not acceptable

Part c (2 marks)

List two (2) additional test that you would order for this patient.

Model Answer

- **UEC**
- Shiga toxin
- Urine MCS
- Blood cultures
- CRP, LFTs, G&H
- Chest X-ray

Question 17 (12 marks)

A 40 year old male presents with acute alcohol intoxication asking for an inpatient detox. He has a background of alcohol use disorder.

Part a (6 marks)

List six (6) diagnostic criteria that are used to diagnose this condition.

Model Answer

In the past year you have:

- Drinking more, or for longer than intended
- More than once wanted to cut down or stop drinking, or tried to, but couldn't
- Spent a lot of time drinking? Or being sick or recovering from the after effects
- Wanting to drink so much that you couldn't think of anything else
- Drinking or recovering from drinking, often interferes with family, work or education
- Continuing to drink despite problems caused with friends or family.
- Interesting or pleasurable, due to drinking
- Finding oneself in dangerous or harmful situations as a direct result of drinking
- Continuing to drink despite adding to another health problem, feeling depressed or anxious or blacking out
- Drinking more as a result of a tolerance to alcohol
- Experiencing withdrawal symptoms

Mild = 2-3 features

Moderate = 4-5 features

Severe = 6 or more features

Part b (6 marks)

Aside from benzodiazepines and thiamine, complete the table with three (3) medications used in the pharmacotherapy of alcohol use disorder and state their mechanism of action.

Model Answer

Medication	Mechanism of action
Naltrexone	Long acting opioid antagonist. Naltrexone also modifies the hypothalamic-pituitary-adrenal axis to suppress ethanol consumption
Acamprosate	NMDA receptor antagonist and modulator of GABA receptors - causing anticraving effect
Disulfiram	Inhibits the enzyme aldehyde dehydrogenase. Results in increased serum acetaldehyde, causing diaphoresis, palpitations, facial flushing, nausea, vertigo, hypotension, and tachycardia.

Question 18 (12 marks)

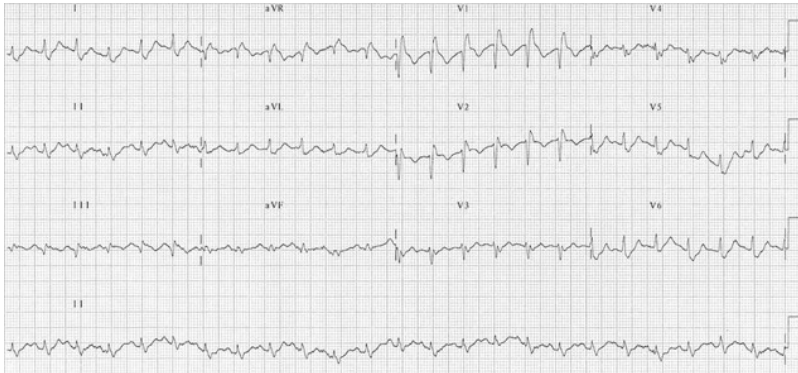
A 34 year old female is brought to your tertiary ED after collapsing in the street. Paramedics commenced ALS for a PEA arrest and achieved return of spontaneous circulation after two minutes of CPR and 1 mg adrenaline.

Vital signs are as follows:

BP 100/40 mmHg

GCS 15/15

Her ECG is shown below.



Part a (4 marks)

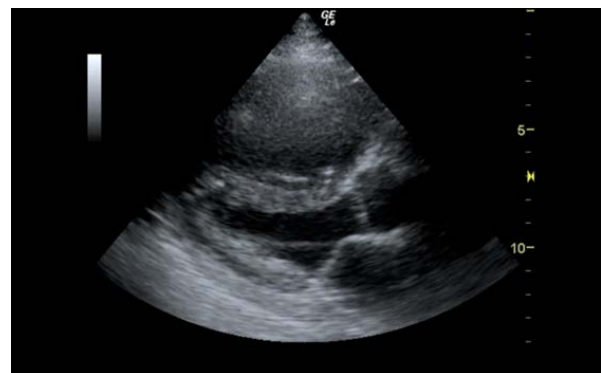
Outline four (4) abnormalities.

Model Answer

- Sinus tachycardia
- RBBB
- T-wave inversion in the right precordial leads (V1-3) and III (RV strain pattern)
- SI QIII T III
- Poor R wave progression
- Rightward axis

Part b (3 marks)

A bedside ultrasound is performed.



List three (3) abnormal findings in these images.

Model Answer

- Small LV cavity size

- Septal flattening, bowing into LV
- Severely dilated RV
- Dilated RA
- May mention artefact in RV which could represent thrombus

Part c (5 marks)

The patient has a further witnessed PEA cardiac arrest in the resuscitation bay and ALS is commenced.

List five (5) priorities in your subsequent management of this patient.

Model Answer

- Thrombolysis indicated for likely massive PE. Arrest dosing - **Alteplase 50mg** stat (with option to repeat in 15 mins) Tenectapase 0.5mg/kg bolus
- Secure airway
- Initiate ECMO referral
- Further expert assistance - IR or Ctx for thrombectomy (expecting ROSC), ICU for milrinone/pressor support, iNO/ GTN
- Judicious fluid resuscitation

Question 19 (12 marks)

A frail 78 year old male is brought into ED by his son with three days of fevers, cough, and confusion. He has a background of hypertension and type 2 diabetes.

A venous blood gas is shown below.

pH	7.3
Na	135
K	3.0
Glucose	35
Ketones	0.8
Ur	18 mmol/L
Cr	150 umol/L

Part a (4 marks)

Describe and interpret this blood gas. Provide two (2) derived calculations with your working.

Model Answer

Osmolality: $2(\text{Na}) + \text{glu} + \text{urea} = 270 + 35 + 18 = 323$ (HIGH)

Corrected Na= measured Na + $\text{glu} - 5/3 = 135 + 35 - 5/3 = 145$

Corrected K+ = $3.0 + (7.5 - 7.3)/4 = 3.5$

UCR: $18000:150 = 180:1.5 = 120:1$ (PRE-RENAL)

Part b (5 marks)

The patient's vital signs are:

Temp	38.5 °C
HR	120 bpm
BP	90/50 mmHg
SaO ₂	95 % on 2L NP
GCS	14/15

List five (5) priorities in the management of this patient.

Model Answer

- Fluid rehydration, aim correction/48hrs, 0.9% saline 500ml in first hr, aim HR <100,
- Insulin infusion 0.05U/kg/hr, aim reduce glucose <5mmol/hr
- Start potassium replacement at 10mmol/hr aim K 3.5-4.5
- Treat underlying pneumonia with IV ceftriaxone 2g and 500mg IV azithromycin
- Other, something sensible: ICU referral given osmolality >320 (DUNN says 350), endocrine consult, DVT prophylaxis - **other only scores one mark.**

Part c (3 marks)

You notice the patient is soiled and appears very unkempt.

List three (3) risk factors for elder abuse.

Model Answer

- Advanced age
- Social isolation
- Low SES
- Disability, physical impairment
- Dementia, cognitive impairment
- Depression, psychological problems
- Caretake: mental illness, substance abuse

Question 20 (18 marks)

A 5 month old male is brought to the emergency department with a two day history of nasal secretions, increased work of breathing and poor feeding. Bronchiolitis is diagnosed.

Part a (4 marks)

List four (4) differential diagnoses to consider in infants with bronchiolitis.

Model Answer

- Pneumonia
- Heart failure
- Foreign body aspiration
- Whooping cough

Part b (7 marks)

List seven (7) risk factors for the development of more serious illness in infants with bronchiolitis.

Model Answer

- Gestational age < 36-37/40
- Chronological age < 10-12/40
- Chronic lung disease
- Congenital heart disease
- Chronic neurological condition
- Failure to thrive
- Cigarette smoke exposure
- Indigenous background

Part c (6 marks)

Other than the above risk factors, list seven (7) indications for admission for an infant with bronchiolitis.

Model Answer

- Oxygen requirement
- Apnoeic episodes
- Mod- severe WOB
- Decreased feeding to require NGT or IVF
- Poor social supports
- Geographical isolation
- Early phase of illness (expected to become worse)

Question 21 (12 marks)

A 16 year old female is brought in by ambulance following a cardiac arrest secondary to status asthmaticus. She is intubated and ventilated with continuous nebulised salbutamol running and wide-bore IV access is secured.

Her vital signs are:

SpO₂ 75 % on FiO₂ 1.0
HR 165 regular
BP 85/60 mmHg
RR 20 via BVM

Part a (12 marks)

Complete the table below to show your management priorities in the first 30 minutes of this patient's presentation.

Model Answer

Bronchodilator therapies	Additional therapies
1. Adrenaline IVI 5-25mcg/kg/min 2. Salbutamol IVI 5mcg/kg bolus up to 200mcg, then 1-20mcg/min 3. Aminophylline 4. Ketamine bolus/ IVI 1-3mg/kg/hr titrated to SpO₂>92%, MAP >65 5. MgSO₄ 10-20mmol IV bolus 6. Antimuscarinics – Ipratropium 500mcg nebulised 7. Volatile anaesthetic – early referral to anaesthetics/ ICU for sevoflurane aiming MAC 1 Additional ½ marks for clinical or biochemical target parameters: • SpO₂>92%, MAP >65/ SBP >90 • pH >7.2, pCO₂ <50, pO₂ >60 • Or similar	1. Treat for pneumothorax – bilateral needle or finger thoracostomies 2. Fluid bolus – 1L titrated to MAP >65 (improve preload) 3. Disconnect ETT for manual chest compression 4. Obstructive ventilation strategy - RR 6-8, Low Vt, IE 1:5 or above, accept high plateau pressures, permissive hypercapnia (beware in head injury or pregnancy) 5. Paralysis – rocuronium 2mg/kg IV bolus/ Cisatracurium IVI 6. Early referral for ECMO (if not improving)

Question 22 (18 marks)

A 13 year old female presents to your tertiary Emergency Department with abdominal pain, nausea and extreme lethargy. She is in the resuscitation bay with full cardiorespiratory monitoring.

A venous blood gas has been sent:

pH	6.93
pCO ₂	9 mmHg
pO ₂	44.9 mmHg
HCO ₃	2 mmol/L
BE	-25.5 mmol/L
Na	124 mmol/L
K	6.2 mmol/L
Cl	79 mmol/L
Hb	162 g/L
Glc	43.5 mmol/L
Ketones	6

Part a (4 marks)

Analyse and interpret the VBG.

Model Answer

Life threatening metabolic acidosis

Winter's formula – $1.5 \times \text{HCO}_3 + 8 \pm 2 = 11$ – no associated respiratory acidosis or alkalosis

AG – $124 - (79 + 2) = 43 \Rightarrow$ **HAGMA**

Delta ratio or Delta gap = $43 - 12 / 25 - 2 = 1.5 \Rightarrow$ Pure HAGMA

Potassium correction – $5 - (0.5 \times 5) = 2.5$ therefore corrected potassium is 3.

Severe hyperglycaemia

Sodium correction – $43 + 5 / 3 = 16$ therefore corrected sodium 140 i.e normal

Interpretation: Life-threatening HAGMA with severe hyperglycaemia in keeping with **DKA**

Part b (3 marks)

Excluding infection state three (3) other potential precipitants for this diagnosis.

Model Answer

- Lack of endogenous insulin (ie. first presentation of T1DM)
- Lack of exogenous insulin (missed dose, insulin pump failure)
- Excess carb load
- Pregnancy
- Any major illness
- Drugs - cocaine
- Medications - antipsychotics, Thiazides

Part c (7 marks)

Her vital signs are below:

GCS	14/15 (E3, V5, M6)
HR	145 bpm
RR	38 /min
BP	100/80 mmHg
Temp	38.5 °C
Central CRT	4 secs

State your management priorities for this patient.

Model Answer

Correct dehydration. IVF bolus given tachycardia and evidence of poor perfusion– 10ml/kg
Normal Saline bolus

Insulin infusion - aim to start 1 hour after fluid bolus - **0.05-0.1 units/kg/hr actrapid**

Ongoing fluid replacement

- Aim to **replace deficit over 48 hours**
- Add 40mmol/L **KCL** to IVF if K<5 and passing urine
- Add 5% dextrose to fluids once BSL <15

Seek and treat precipitant – CXR to assess for pneumonia, UA to check for UTI, Blood cultures,

Empiric antibiotics given shocked and febrile, **dose and route**

Monitor for complications – insert ART line for hourly blood sampling, hypoglycaemia, hypokalaemia, cerebral oedema

Disposition – Endocrine admission, **ICU**

Part d (4 marks)

Despite the above measures, the patient deteriorates. She becomes drowsy, bradycardic and starts vomiting.

State your next management steps.

Model Answer

- **Rule out hypoglycaemia**
- Raise head of bed to 20-30 degrees
- Decrease fluid rate by $\frac{2}{3}$
- Consider Mannitol
- Active airway management to avoid hypercarbia (and protect airway as vomiting)
- Consider CTB/ MRI when more stable

(Must rule out hypoglycaemia and have an approach to recognising cerebral oedema as the complication)

Question 23 (12 marks)

A 26 year old female presents with lethargy and thoughts of self harm on a background of anorexia nervosa.

Part a (4 marks)

List four (4) of the diagnostic criteria for anorexia nervosa.

Model Answer

- BMI < 17 (or body weight >15% below expected)
- Intense fear of gaining weight
- Restriction of energy intake relative to requirements (leading to a significantly low body weight in the context of age, sex, developmental trajectory, and physical health. Significantly low weight is defined as a weight that is less than minimally normal or, for children and adolescents, less than that minimally expected)
- Body image distortion

Part b (4 marks)

During your assessment she complains of chest pain and palpitations.

List four (4) ECG changes associated with anorexia nervosa.

Model Answer

- T wave inversion
- ST depression
- Prolonged QTc
- U waves
- Atrial ectopic beats
- VT may occur

Part c (4 marks)

You decide she needs a medical admission to the ward for stabilisation prior to a mental health admission.

Excluding ECG changes and BMI list four (4) MEDICAL indications for admission.

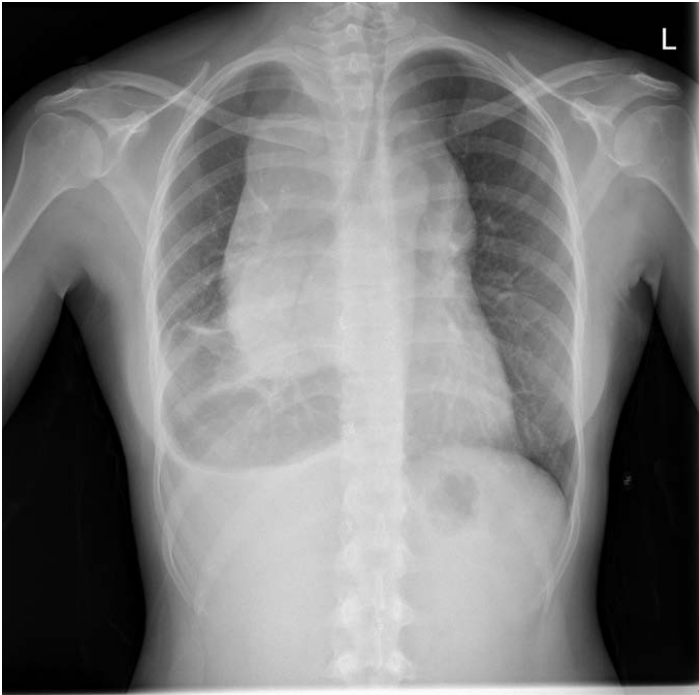
Model Answer

- HR < 40 bpm
- BP < 90/60 or postural BP drop > 20mmHg
- Symptomatic hypoglycaemia
- Temp < 36 °C
- Dehydration
- Na < 130
- K < 3
- Phosphate < 0.5
- Neutropaenia (< 0.7)
- ALT > 500

Question 24 (12 marks)

A 24 year old female presents with chest pain and general malaise. She is previously well with no significant medical history.

Her chest X-ray is shown.



Part a (3 marks)

List three (3) significant abnormalities on this chest X-ray.

Model Answer

- Mediastinal mass
- Significant tracheal narrowing/leftward tracheal deviation
- Hilar lymphadenopathy (difficult to comment on this with superimposed mass)
- Right pleural effusion
- Right mid-zone linear atelectasis/collapse

Part b (3 marks)

Name three (3) differential diagnoses for the chest X-ray findings in this patient.

Model Answer

- Lymphoma
- Acute leukaemia
- Thymic tumour
- Teratoma

Part c (4 marks)

List four (4) clinical findings that occur in SVC obstruction.

Model Answer

- Face/neck swelling
- Plethora

- Distended neck veins
- Distended chest vein collaterals
- Conjunctival suffusion/injection
- Upper extremity swelling
- Cough/dyspnoea/orthopnoea
- Tachypnoea
- Exophthalmos
- Pemberton's sign

Part d (2 marks)

List and justify two (2) further investigations that should be performed early in this patient.

Model Answer

- FBC and blood film - malignant cells
- CT chest (high resolution) - mass
- Echocardiogram – *(model answer not provided)*
- ECG – *(model answer not provided)*

Question 25 (12 marks)

A 13 year old male presents to ED with an injury to his left eye.

He was strapping his surfboard to the roof racks of his mother's car, and one of the bungee cords flicked off and hit him in the eye. He lost vision in the eye for about 20 minutes, but it gradually returned and it now only slightly blurry.

This is his eye on arrival to ED.



Part a (1 mark)

Describe the most pertinent finding in this image.

Model Answer

Hyphaema – a blood level is visible in the anterior chamber

Part b (4 marks)

What is the grading system for this pathology?

Model Answer

Grade I – level sits below the pupil – as in this case

Grade II – partly covers the pupil

Grade III – covers the pupil

Grade IV – Fills the anterior chamber completely

Part c (4 marks)

List four (4) management priorities for this patient.

Model Answer

- Head elevation
- Bed rest
- Analgesia
- Treat nausea, avoid vomiting
- Ophthalmology consultation
 - o Cycloplegic drop
 - o Steroid drops
 - o Monitor IOP

Part d (3 marks)

List three (3) indications for hospital admission with this type of eye injury.

Model Answer

- Large hyphaemas > 50%
- Raised IOP
- Coagulopathy
- Unable to comply with bed rest, eye drops
- Unable to attend for daily review

Question 26 (12 marks)

A 24 year old female presents with an acute exacerbation of asthma. She has been treated with maximal medical therapy. She has a previous history of ICU admissions for severe asthma including intubation.

Her current observations are:

GCS	8 (E2, V1, M5)
SpO ₂	78 % 15L NRB with salbutamol running by continuous nebuliser
HR	50 bpm
BP	85/65 mmHg
Temp	36.6 °C

This patient requires urgent intubation.

Part a (8 marks)

List four (4) potential complications of a rapid sequence intubation in patients presenting with life-threatening asthma, and a measure to minimise the likelihood of each.

Model Answer

Complication	Measure to minimise likelihood
Hypoxia	Preoxygenate with BiPAP Ventilate through apnoeic period Ketamine as induction agent?
Hypercarbia/Acidosis	Ventilate through apnoeic period
Hypotension	Fluid bolus prior to RSI Push dose pressors (adrenaline) Dose adjustment of induction agents Ketamine as induction agent
Cardiac Arrest	Any of above measures
Failed intubation	Anything reasonable

Part b (4 marks)

You successfully intubate the patient.

Shortly after intubation of the patient the nurse advises you the BP is now 60 mmHg systolic.

State four (4) potential causes of the post intubation haemodynamic instability.

Model Answer

- Pneumothorax
- Anaphylaxis
- Breath Stacking/ dynamic hyperinflation
- Induction Agent
- Hypovolaemia

Question 27 (12 marks)

A 28 year old female presents to your urban district ED. She is G1P0 30/40 gestation. She slipped on wet tiles and injured her right shoulder with significant pain on minimal mobilisation. Radiographs show an anterior shoulder dislocation. This is an isolated injury. She has no drug allergies and takes no regular medication.

Her vital signs are unremarkable. She has no abdominal pain or PV bleeding.

Part a (8 marks)

List your options/techniques for shoulder relocation in this scenario in the table below, with pros and cons of each technique.

Model Answer

Technique	Pro	Con
Cunningham (ie simple analgesia only)	No sedation required	Difficult if patient is in significant pain Additional analgesia eg. Opioid required Require patient cooperation
Nitrous Oxide	Safe, fast onset, short acting	Side effects eg. Nausea, vomiting Resources (staff, space...) Consider contraindications (none present from stem) Environmental considerations
Procedural sedation	Patient comfort	Resources (staff, space ...) Higher risk of airway complications • anatomically difficult • increased aspiration risk • low FRC/ hypoxia risk Longer admission
Regional anaesthesia – interscalene brachial plex / intra-articular	No systemic analgesia required. Few resources required.	Requires patient cooperation. Risk phrenic nerve injury for interscalene brachial plexus. Joint infection. Adequate experience/ expertise. Failure.

Part b (4 marks)

The patient undergoes procedural sedation.

List two (2) anatomical and two (2) physiological changes that occur in pregnancy that would potentially affect your approach to procedural sedation in this patient.

Model Answer

Anatomical:

Increased risk of difficult airway due to:

- Airway mucosal congestion/ hyperaemia and hypersecretion
- Pharyngeal crowding
- Increased breast tissue

Physiological:

Increased risk of rapid desaturation due to:

- Increased O₂ consumption

- Decreased FRC

Increased risk of aspiration due to:

- Decreased gastric motility
- Relaxed GOS
- Raised diaphragm

Increased risk of haemodynamic instability due to:

- Decreased venous return/ aortocaval compression
- Decreased SVR