

The Prince Charles Hospital
The Royal Brisbane & Women Hospital
Redcliffe Hospital

Metro North Hospitals ACEM Fellowship Trial Examination

2016.1

Short Answer Questions

Model Answers

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SAQ1: Double Question (Part 1)

1- Outline 4 key features of your assessment of this patient in the ED. (4 marks)

Vital signs
Abdominal examination – looking for fetal lie & engagement
Sterile speculum examination – looking for degree of cervical dilatation, PV bleeding or amniotic fluid leak
Bedside USS to confirm fetal HR & lie

2-List 4 medications (including doses) that you would consider giving to this patient in your ED. (4 marks)

Betamethasone 11.4mg IM
Salbutamol 5mg neb
Nifedipine 20mg orally x 3 in first hour
Mg sulphate 2mg (up to 6mg) IV
Analgesia – nitrous oxide

3- List 4 contraindications that would prevent you transporting this patient to the nearest obstetric centre. (4 marks)

Active labour with > 5cm cervical dilatation or fetal parts on view
Absent fetal HR/bradycardia
Haemodynamic instability of mother
Unable to provide safe escort with appropriately skilled staff
Cord prolapse

SAQ: - Double Question (Part 2)

1-What features on assessment would suggest the need for immediate resuscitation of this neonate? (5 marks)

(APGAR components)
Poor tone
Lack of response to stimulation
HR < 100/min

Respiratory distress or lack of spontaneous respirations

Poor colour (persistently cyanosed check with pulse ox, pallor might indicate acidosis, hypotension from poor CO or anaemia)

2- Complete the following table stating how the resuscitation requirements are different for a neonate in comparison to a child for the given parameters?

(5 marks)

Oxygenation	Room air initially then add 100% O ₂ for neonates that fail to respond to PPV
Ventilation	PPV with 5-8cm H ₂ O via t-piece
CPR – trigger to initiate	HR < 60/min after 60 secs of effective PPV
CPR – rate of compressions	90 compressions/min
CPR – ratio	3:1 ratio of compressions:breaths

3- Complete the following table stating the appropriate equipment sizes & drug doses that you would use in the resuscitation of this neonate?

(5 marks)

ETT size	Size 2.5-3.5 uncuffed
ETT depth	Weight + 6cm depth of insertion
Vascular access device & size	Umbilical catheter Size 5 IV cannula size 24G
Adrenaline dose	10mcg/kg IV
Fluid type & volume	N/saline 10mL/kg

4. Is there a role for cooling in the post resuscitation cares for this neonate?

(2 marks)

Yes, in those who have hypoxic ischaemic encephalopathy- cooling may reduce the degree of brain injury. Commence within 6hrs after birth, 33-34deg for 72hrs and then rewarm gradually

ARC guidelines, section 13

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SAQ 2:

1- List 2 abnormalities in the clinical photograph: (2 marks)

Right maxillary tooth (1,1) – intrusion luxation

Left maxillary tooth (2,1) – horizontal fracture involving pulp

2- List three (3) analgesic choices for this patient (3 marks)

Oral – Paracetamol 1g/ Ibuprofen 400mg

Intranasal – Fentanyl 1.5-2mcg/kg

Dental / alveolar nerve block, 1-2ml of 1-2% lignocaine

3- List the immediate management steps of this dental injury. (4 marks)

Repositioning and splinting of tooth 1,1

Calcium hydroxide to cap tooth 2,1

Urgent dental or max/fax referral

Update ADT if not completed

Antibiotics – amoxicillin/clavulanate

SAQ 3: Questions:

- 1- List 4 metabolic abnormalities including any calculations required. (4 marks)

Sever metabolic acidosis (Low HCo₃)

Expected Resp compensation with low Pco₂ but actual Pco₂ very high

→ **Concurrent Resp acidosis**

Anion Gap: Na - (Cl+HCo₃)

$$136 - (90+9) = 36 \rightarrow \text{HAGMA}$$

Delta Ratio : $\Delta AG / \Delta HCo_3 = 25 / 15 = > 1$ Therefore Pure HAGMA

Urea/Creatinine ratio $18 / 0.12 = > 100$

→ **Pre-renal failure**

- 2- What's the A-a gradient for the above patient: (1 mark)

A-a gradient: $150 - 1.2 \times PCO_2 - PO_2$

$$150 - 86 - 60 = 0 \text{ Normal}$$

Hypoxia → Hypoventilation

- 3- List 5 potential causes for her presentation: (5 marks)

CNS Depression: Toxin (Benoz, opioid, alcohol, ect)

Head Injury

Sever sepsis

Airway obstruction:

Asthma

Metabolic:

DKA with cerebral oedema

Neuromuscular Weakness: Organophosphate Poisoning

Botulism

SAQ 4:

Questions:

1- Describe the findings in this image: (2 Marks)

Fracture through the anterior and posterior arches of C1 with lateral distraction

2-What is this injury called and what is the likely mechanism? (2 Marks)

Jefferson Fracture (axial compression)

3- Outline your 4 immediate priorities: (4 Marks)

Spinal immobilisation

Assessment of ventilation and consideration of early airway intervention

Detailed neurological assessment

Assessment for other injuries

Early referral to a spinal unit

4- Give 2 indications for MRI in this injury? (2 Marks)

Complete or incomplete neurological deficits

Deteriorating neurological status

Suspected ligamentous or intervertebral disc injury

SAQ 5:

Questions:

1- State 3 important features on the above ECG. (3 Marks)

ECG- 60. Atrial pacing.
LBBB native ventricular conduction.
No sgarbossa criteria.

2- State your working diagnosis for this patient: (1 Mark)

Acute coronary syndrome high risk non ST elevation MI.

3- List the criteria you would use to risk stratify this patient by completing the table provided:

(Features associated with high-risk, intermediate-risk and low-risk non-ST- segment-elevation acute coronary syndromes (NSTEACS)) (16 Marks)

High-risk features:

Presentation with clinical features consistent with acute coronary syndromes (ACS) and any of the following high-risk features:

1. Repetitive or prolonged (> 10 minutes) ongoing chest pain or discomfort;
2. Elevated level of at least one cardiac biomarker (troponin or creatine kinase-MB isoenzyme);
3. Persistent or dynamic electrocardiographic changes of ST- segment depression \geq 0.5 mm or new T-wave inversion \geq 2 mm;
4. Transient ST-segment elevation (\geq 0.5 mm) in more than two contiguous leads;
5. Haemodynamic compromise — systolic blood pressure < 90 mmHg, cool peripheries, diaphoresis, Killip Class > I, and/or new-onset mitral regurgitation;
6. Sustained ventricular tachycardia;
7. Syncope;
8. Left ventricular systolic dysfunction (left ventricular ejection fraction < 0.40);
9. Prior percutaneous coronary intervention within 6 months or prior coronary artery bypass surgery;
10. Presence of known diabetes (with typical symptoms of ACS); or
11. Chronic kidney disease (estimated glomerular filtration rate < 60 mL/minute) (with typical symptoms of ACS).

Intermediate-risk features:

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Presentation with clinical features consistent with ACS and any of the following intermediate risk features AND NOT meeting the criteria for high-risk ACS:

1. Chest pain or discomfort within the past 48 hours that occurred at rest, or was repetitive or prolonged (but currently resolved);
2. Age >65 years;
3. Known coronary heart disease — prior myocardial infarction with left ventricular ejection fraction \leq 0.40, or known coronary lesion more than 50% stenosed;
4. No high-risk changes on electrocardiography (see above);
5. Two or more of the following risk factors: known hypertension, family history, active smoking or hyperlipidaemia;
6. Presence of known diabetes (with atypical symptoms of ACS);
7. Chronic kidney disease (estimated glomerular filtration rate < 60 mL/minute) (with atypical symptoms of ACS); or
8. Prior aspirin use.

Low-risk features:

Presentation with clinical features consistent with an acute coronary syndrome without intermediate-risk or high-risk features.

This includes onset of anginal symptoms within the last month, or worsening in severity or frequency of angina, or lowering of anginal threshold.

4- List 4 components of treatment for this patient in the ED: (4 Marks)

Aspirin 300 mg PO
Morphine 2.5 mg aliquots iv
GTN spray PRN sublingual
Anti coagulation with Clexane 1mg/ kg SC to max 100mg.

SAQ 6 :

1- List six (6) potential causes of acute pancreatitis to enquire about in the history

(6 Marks)

Answer:

alcohol;

gallstones;

pancreatic / periampullary cancer;

trauma;

post ERCP;

hypercalcaemia;

hyperlipidaemia [types I, IV, V - types not essential]

2- List three features on CT scan associated with severe disease: (3 Marks)

Answer: focal or diffuse enlargement; fat stranding; single fluid collection; multiple fluid collections; necrosis; [+ accept necrosis < 33%, and >50% as two different features] (Balthazar criteria).

3- He is admitted to hospital, and his wife asks what complications might be expected?

List four potential complications: (4 Marks)

Answer: (Local): pancreatic pseudocyst; abscess; portal/splenic vein thrombosis [accept either or both as one answer]; duodenal obstruction

(Systemic): organ failure; ARDS; hypocalcaemia; pleural effusion; progression to chronic pancreatitis

SAQ 7:

Questions:

1- List three (3) classes of agents that could cause this presentation. (3 marks)

Sympathomimetics

- a. Serotonergic drugs
- b. Anticholinergic agents
- c. Antipsychotics

2- List three (3) key investigations you would perform: (3 marks)

- a. BSL – hypoglycaemia
- b. BHCG – pregnancy related eclampsia
- c. Electrolytes – Hyponatremia
- d. CT head – rule out intracranial bleed

3- You have elected to secure the patient's airway. What agents will you use for intubation? (2 marks)

Rocuronium 1.2mg/kg + any of propofol 1-2ml/kg, Fentanyl 2mcg/kg or morphine 0.1 mg/kg and midazolam 0.1 mg/kg, thiopentone 3-5mg/kg

Suxethonium = 0 marks for this section. Unsafe practice in hyperthermic patient.

4- List 4 complications that could arise from this presentation? (4 marks)

- a. Rhabdomyolysis
- b. Renal failure
- c. Hypoxic encephalopathy
- d. Intracranial haemorrhage
- e. Acute MI
- f. Posterior Shoulder dislocations
- g. Compartment syndrome

SAQ 8 :

Questions:

1. List 3 parties that need to be involved in this process, outside of the ED staff: (3 Marks)
 - a. Radiology Department – regarding testing
 - b. Respiratory/Department of Medicine – regarding testing and follow up Possible:
 - c. Haematology –regarding specific testing

2. List 8 components that will form part of your ED guideline: (8 Marks)
 - a. Title and Setting
 - b. Background
 - c. Aims
 - d. Inclusion criteria
 - e. Exclusion Criteria
 - f. Guideline – flow with supporting data/references
 - g. References
 - h. Date for audit/review
 - i. Sign off

3. List the sources you would use for writing the clinical component of the guideline: (4 Marks)
 - Local guidelines (prior version, other departments within the same hospital)
 - Guidelines from similar hospitals
 - Published national standards (ie NHMRC, NICE)
 - Systematic Reviews (ie Cochrane) addressing the topic
 - Any recent journal articles that have practice changing implications
 - Canvassed opinion from stakeholders

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SAQ 9:

1- List 4 likely Diagnoses and the 2 features on examination that would lead to you to that diagnosis: (12 Marks)

Diagnosis	Exam feature 1	Exam feature 2
Renal Colic	renal angle tenderness, tachycardia	Colicky pain, Absence of fever or low grade only
Pyelonephritis/ abscess	fever, hypotension,	renal angle tenderness tachycardia, tachypnoea
AAA	pulsatile mass, bruit	hypotension
L1-L2 radicular pain,	midline back pain	neurological deficits
Basal pneumonia-	fever, crackles	hypoxia
Renal artery embolism/aneurysm	Atrial Fibrillation (irregularly irregular pulse) in renal art embolism	Hypotension or mild Hypertension- in renal aneurysm or

2- List 3 potential imaging modalities for this patient and Weigh up 2 pro's and con's of each (15 Marks)

Imaging modality	Pro's (2)	Cons(2)
CTKUB	1. no contrast, 2. allows non-renal causes to be identified (AAA)	1. radiation, cumulative as likely to have recurrent stones 2. If pt unstable with AAA not suitable for scan
USS	1. No radiation, 2.No contrast 3. Safe in pregnancy. 4. non-invasive	1.sometimes cannot see the stone therefore unable to measure the size/ Poor detection of calculi in the distal urethra, 2.lack of availability out of hours

Xray KUB	<ol style="list-style-type: none"> 1. readily available 2. lower radiation than CTKUB 3. good additional test to allow x-ray follow up if radiopaque 	<ol style="list-style-type: none"> 1. difficult to differentiate calculi from phleboliths 2. some stones not radiopaque
IVP	<ol style="list-style-type: none"> 1. historically the gold standard 2. can detect non-functioning kidney (AAA, renal art embolism, renal art thrombosis) as well as delayed filling (distal obstruction, extravasation, renal mass, bladder or ureteric tumour or filling defect of radiolucent stone) 	<ol style="list-style-type: none"> 1. Contrast allergy, 2. renal injury from contrast 3. contraindicated in multiple myeloma 4. time consuming
MRI	<ol style="list-style-type: none"> 1. no radiation 	<ol style="list-style-type: none"> 1. availability 2. usually not in ED accessibility to pt, risk of taking pt with AAA not renal colic to the scanner

3- He is diagnosed with a renal calculi, State 5 criteria that would determine his disposition: (5 Marks)

1. If this is a sole kidney
2. ongoing pain despite adequate analgesia- failure to settle
3. Suspicion of urinary infection
4. High degree of obstruction
5. Size of stone if large urology may elect early surgical management
6. Social considerations, time of day, coping at home

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SAQ 10: (Part 1 of Double Questions)

1-What are 6 cardinal features of life threatening asthma?

(6 marks)

Confusion
Coma
Exhaustion
poor respiratory effort
silent chest
cyanosis
hypotension

2- On examination, she is unable to speak in full sentences and has marked use of accessory muscles.

List your immediate management, including any drug doses.

(4 marks)

Ventolin 6 puffs by MDI or nebuliser Q20min x3 then review,
Ipratropium bromide 4 puffs Q20 min
Prednisolone 1mg/kg (methylpred/hydrocort alternatives)
MgSo4 50mg/kg IV bolus

3- List 4 complications that may ensue during this scenario.

(4 Marks)

Worsening hypoxia or hypercarbia despite escalation of treatment
Apnea
ALOC
Pneumothorax
Vomiting
Agitation 2nd to salbutamol toxicity

SAQ 10 (Part 2 of Double Question continue):

4- Despite appropriate escalation of treatment, the child's condition deteriorates over several hours and she has been intubated in the ED.

State your ventilation settings and provide appropriate justification.

(10 marks)

Parameter	Setting	Justify
Respiratory Rate	<10/min	Normal RR in 5y 20-30, answer should be less than this to allow time for expiration
Tidal volume	5-7ml/kg	Decreases barotrauma
Peak inspiratory pressure	35-50cmH20	Necessary to overcome high airway pressures
PEEP	0-5cm H20	Patient has high intrinsic PEEP - low extrinsic PEEP prevents gas trapping
I:E ratio	1:4-8	Allows time for expiration

5- After connecting to the ventilator the patient suddenly deteriorates becoming progressively hypotensive and tachycardic.

Give three possible causes.

(3 marks)

Dynamic hyperinflation/gas trapping

Tension pneumothorax,

Effect of induction agents,

Hypovolaemia,

Equipment failure - tube dislodgement/O2 not connected)

SAQ 11 :

Questions:

1-List 3 important features of this X-Ray. (3 marks)

Humeral head dislocated inferior and medial to normal position

Superior cortical irregularity suggests Hill-Sachs lesion

No clear labral irregularity to suggest Bankart lesion

2- Detail how you will confirm that this is an anterior shoulder dislocation? (2 marks)

Clinically—humeral head sub-coracoid and palpable in the deltopectoral groove, OR

Radiographically—Scapular Y or Axillary View & humeral head anterior to glenoid

3- It is confirmed that there is an anterior dislocation. After treating the patient with 100 mcg of intravenous fentanyl, he reports significantly improved pain. You decide use nitrous oxide to facilitate the reduction of the dislocation.

Detail in point form your preparation for and undertaking of the procedure you will use to reduce the dislocation.

(10 marks)

Must include equipment considerations. (3)

Must include instructions given to patient. (2)

Must include a reasonable description of a reasonable technique. (5)

The name of a technique is not enough by itself.

Need not include a name. If includes a name must correctly describe it.

Eg: Check nitrous oxide cylinder sufficiently full.

New filter and mouthpiece for nitrous oxide cylinder.

Pulse and sats monitoring for patient.

Instruct patient to breathe deeply in and out through mouthpiece.

Instruct patient to keep upright against bed push chest out/shoulder blades back.

Begin with gentle traction on elbow in current direction of humerus.

Add slow external rotation of humerus.

Add slow abduction of humerus.

Stop and allow/massage muscles to relax whenever pain/spasm is caused.

Relocation will be signalled with a clunk.

Place in shoulder immobiliser sling.

XRray to confirm reduction.

4- List 4 items of discharge advice will you give.

(4 marks)

Remain in shoulder immobiliser at all times except showering.

At no time abduct or externally rotate shoulder. Demonstrate this position.

Attend followup

Simple analgesia as required.

Return if reoccurs.

SAQ 12:

Questions:

1- List 6 possible aetiologies with specific examples that may cause this presentation.

(12 Marks)

Aetiological Category	Specific Example
Sepsis / Infection	Meningitis / Pneumonia
Cardiac / Congenital heart disease	Hypoplastic left heart, Ductal dependent lesion, myocarditis, cardiomyopathy metabolic
Metabolic	Inborn error metabolism, mitochondrial disorder, Fatty acid oxidation disorder
Endocrine	CAH, Congenital Hypothyroidism, BARRTERS syndrome
NAI / Trauma	Rib trauma, Shaken baby syndrome, SAH, duodenal rupture, neglect with dehydration
Toxin / exposure / poisoning	NAI related, botulism, food poisoning – formula related, incorrectly constituted formula

2- List your management priorities in sequential order.

(4 marks)

Airway/breathing – airway manoeuvres and oxygen – improve saturation, IPPV via bag mask, if persistent hypoxia or poor resp effort, will likely require RSI

Treat shock – IV access, IO if unable and IV fluid – 10-20ml/kg bolus NS (smaller bolus in case of CHD), reassess and repeat

Seek/treat hypoglycaemia 2ml/kg 10% dextrose

Source control – Assume sepsis and empirically treatment with antibiotics – cefotaxime 100mg/kg and amoxicillin 50mg/kg

If CHD strongly suspected – prostaglandin infusion

Empiric treatment with hydrocortisone 4mg/kg if unresponsive to fluids – suspect CAH.

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3- You decide to intubate this baby. List your equipment and drugs for RSI.
(4 marks)

3 and 3.5mm ETT uncuffed / 2.5 and 3.0 if cuffed tube
Suxamethonium – 1-2mg/kg
Midazolam 0.15 mg/kg
Fentanyl – 2-3 mcg/kg (may cause chest wall rigidity)
Or Ketamine 1-2 mg/kg

SAQ 13:

1- Detail, in point form, your preparations for her arrival. (15 marks)

Answer:

PREPARE AREA—RESUSCITATION AREA WITH FULL NON-INVASIVE MONITORING

PREPARE TEAM and ROLES (AT LEAST 2 doctors 2 nurses)—

- team leader (YOU)
- doctor for primary survey/access
- Nurse for monitoring/equipment/access
- Nurse for documentation

PREPARE EQUIPMENT—

- Defibrillator
- ACLS drugs
- Adenosine 6mg

PREPARE PLAN—

- If conscious then—
 - Attach defib
 - Gain access
 - Primary survey
 - Defib if unstable
 - If SVT then Vagal then Drugs if stable
- If unconscious/no output then—
 - CPR and advanced life support algorithm

2- On arrival the patient is normotensive, GCS 15/15 and complains of palpitations.

Her ECG is reproduced on the next page.

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2- List 7 important features of this ECG:

(7 marks)

Answer:

Tachycardia rate 150–170

No P waves visible

Normal axis

Narrow complex QRS 80ms

QT interval $> \frac{1}{2}$ RR interval

Just/almost meets criteria for LVH largest praecordial R + S > 45 mm

Lateral & inferior ST depression with variable ~ 1 mm ST elevation aVR

3- List 5 differential diagnoses for the cardiac rhythm depicted:

(5 marks)

Atrial flutter

AV Node re-entrant tachycardia

Atrial tachycardia

Junctional tachycardia

AV re-entrant tachycardia

4- Attempts to cardiovert the patient's rhythm using vagal manoeuvres and appropriate doses of adenosine have been unsuccessful.

State another drug including route and dosing you will use to attempt cardioversion of this rhythm. (3 marks)

Verapamil 1mg/min iv up to 15mg

Verapamil 5mg slow iv, repeat up to 15mg total if no effect > 5 minutes later

Consider other agents (iv flecainide, beta blocker, amiodarone, digoxin) if really well

described, but verapamil is the only way to get 3 marks.

SAQ 14 :

Questions:

1- Describe the salient features of the above photograph and comment on the most likely diagnosis:

(4 Marks)

- Discrete lesions of varying sizes
- Look like purpura but would need to attempt blanching
- Some purple discoloration ?bruising
- Describe the distribution
- Most likely diagnosis is HSP

2- List 5 other DDX for the above presentation:

(5 Marks)

- Vasculitis other than HSP
- Sepsis : Meningococcal, Staph, Strep
- ITP
- HUS
- Haematological malignancy
- NAI

3-For the table below, list 5 investigations required and justify each one of them:

(10 Marks)

- Urinalysis (Protein/Blood with HSP or HUS)
- BSL (Sepsis)
- FBC, especially Plt (ITP, Malignancy)
- U&E (renal failure in HSP)
- BC if fever or sepsis suspected

4- List 4 possible complications for the above condition:

(4 Marks)

Kidney damage (ESRF, Nephritis)

Intussusception

Gastrointestinal haemorrhage

Recurrent HSP

Orchitis

Testicular torsion

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SAQ 15:

Questions:

1- List three (3) peripheral and three (3) central causes for his symptoms:

(6 Marks)

Central cause	Peripheral cause
Acute cerebellar haemorrhage	BPPV
Posterior circulation CVA	Vestibular neuritis
Posterior fossa tumour	Meniere's disease

2- List 2 features on history and examination that would support a Central VS Peripheral causes. (8 marks)

	History	Examination
Central cause	Gradual onset Longer duration Less intense	Vertical nystagmus Cerebellar signs – ataxia, dysdiadochokinesis
Peripheral cause	Acute onset usually shorter duration More intense symptoms Fatigueability	Horizontal/rotatory nystagmus Dix-Hallpike positive

3- List two (2) key diagnostic investigations you could perform and their respective utility (4 marks)

Investigation	Utility
CT Brain	Easily accessible, rapid Radiation risk Detects large posterior circulation bleeds Not sensitive for posterior circulation pathology
MRI Brain	No radiation risk Not as easily accessible Takes time and cooperation from patient Ideal and more sensitive to detect posterior circulation strokes

SAQ 16:

Questions:

1- For the table below, List three common conditions and their treatments that need to be addressed in the resuscitation of a patient following an overdose?

(6 Marks)

Seizures- benzodiazepines

Hypoglycaemia- dextrose if BSL < 4

Hyper/hypothermia- treat with cooling if temp > 38.5, emergent if > 39.5

Tox handbook page 4

2- The patient is unconscious with nil response to vocal stimuli but with painful stimulation is withdrawing bilaterally and moaning. His respiratory rate is 8 with an obstructed pattern and saturations of 90% on room air.

What initial interventions are required to manage his low Sat?

(3 Marks)

Basic airway manoeuvres- head tilt, chin lift, airway adjuncts

Supplemental oxygen titrated to saturations > 94%

Positioning in left lateral position

ARC guidelines 2014, guideline 4, guideline 10.4

3- Describe and interpret his ECG:

(4 Marks)

ECG changes:

Interventricular conduction delay- QRS > 100msec

Terminal R wave > 3mm in aVR and R/S ratio > 0.7 in aVR

Tachycardic rate ~110, sinus rhythm- p waves in T waves- best seen in V1, R axis deviation

Interpretation:

Sodium channel blockade

DDx hyperkalaemia

4- This patient's repeat vital signs include:

GCS 4/15 (E1, V2, M1)
HR 100
BP 75/60
RR 12
Sat 96% on a Hudson mask.

What are the priorities for this patient in the initial management? (6 Marks)

Increase oxygen delivery for preparation prior to intubation

Administer IV Sodium Bicarbonate 1-2mEq/kg- assume 80kg male- 100mEq initially and assess response with BP improvement and QRS < 100msec

IV fluid bolus- 500mls N Saline and repeat with aims of SBP > 90mmHg and no evidence of pulmonary oedema, if nil improvement or signs of pulmonary oedema use vasopressors to maintain SBP

Intubate to assist in management of pH with aim 7.5-7.55

Place NGT and consider administering 50g charcoal

Treat seizures with benzodiazepines

SAQ 17:

Questions:

1- List three (3) abnormalities in the given photograph: (3 marks)

Marked conjunctival injection
Hyphaema
Traumatic mydriasis

2- List three (3) possible associated injuries (3 marks)

Lens dislocation
Globe rupture
Orbital wall fracture
Retinal detachment

3- Please list two (2) early and two (2) late complications of the above condition. (4 marks)

Early Complications	Late Complications
Rebleeding	Corneal blood staining
Raised IOP Traumatic iridocyclitis	Posterior/peripheral anterior synechiae Optic atrophy

4- List five (5) management steps for this patient. (5 marks)

- a. Analgesia (avoid NSAIDs, aspirin)
- b. Patch eye
- c. Bed rest and head elevated 30 degrees to aid settling of hyphaema
- d. Topical cycloplegics – homatropine/tropicamide
- e. Treat associated complications – Raised IOP with acetazolamide/topical timolol. Traumatic iridocyclitis – steroids/cycloplegics
- f. Treat associated injuries listed above

SAQ 18 :

1- What are the reversible causes that need to be identified in your assessment?

(8 marks)

Hypoxaemia
Hypovolaemia
Hypo/hyperkalemia/Mg/Ca
Hypo/hyperthermia
Tension Ptx
Tamponade
Toxins- CO, TCAs
Thrombosis- MI/PE

3- Which 5 features are predictive of survival from OOHCA?

(5 marks)

Bystander CPR
In VF/VT on EMS arrival
ROSC in the field
Mild therapeutic hypothermia
PCI if STEMI present

4. List 8 key features of your post-resuscitation care of this patient.

(8 marks)

Ensure adequate tube positioning as above
Ventilate with SIMV 6mL/kg TV x 16, PEEP 5, PS 10 on FiO2 100% initially then weaned to maintain Sats > 92%
Sedation with Fentanyl/Midazolam infusion
Cooling with ice to groin & axillary, aiming temp 36
Invasive monitoring – CVL & IAL
Maintain SBP > 90 with inotropic support if required (Dobutamine/NA infusion)
Aspirin 300mg,
Clopidogrel 600mg via NGT
Heparin 5000U bolus then infusion
Transfer for definitive cardiac management – Cath lab then ICU
IDC
Pressure area cares
Inform NOK and discuss prognosis

SAQ 19 : (Part 1 of Double Questions)

Questions:

1- In the 10 mins before the patient arrives, please indicate 6 priorities in your preparation for this patient: (6 marks)

Activate trauma team
Assign roles
Order PRBC from blood bank (O negative)
Notify radiology & surgical teams
Analgesia (Morphine 0.1mg/kg)
Set up for large bore access

2- On arrival an AP pelvic X-ray is performed as part of the trauma series which is shown below. Please describe the X-ray findings and the implications this will have on the patient's management. (6 marks)

Displaced fracture through pubic symphysis & L SI joint.
Likely vascular injury causing haemodynamic instability
Needs stabilization with pelvic binder, CT Angiography if patient is stabilized and definitive Mx in either theatre or interventional radiology.

SAQ 19 (Part 2 of Double Questions)

3- Despite 2 further units of PRBC, the patient remains hypotensive. You repeat the E-FAST in the trauma room, and it remains negative. The trauma surgeon has just arrived and wants an update. Please give a summary of:

a. What is the most likely cause for this patient's hypotension? (1 mark)

Vascular injury from displaced pelvic fracture

b. What are your recommendations for this patient's disposition (2 marks)

Ideally CT for angiography then interventional radiology but at present too unstable for this. Consider theatre for pelvic packing.

c. Complete the following table to outline 5 ongoing resuscitation priorities for this patient and the specific actions you will take to achieve these. (10 marks)

Resuscitation Priority	Actions Required
Ongoing fluid resuscitation	Secure large bore IV access Activate massive transfusion protocol & continue giving PRBC
Prevent coagulopathy	Avoid use of crystalloids Blood product replacement as guided by MTP or ROTEM
Maintain normothermia	Warm room, cover patient with blankets, warm IV fluids
Assessment for concurrent injuries	CXR, FAST, ideally CT Head/C spine/Chest/Abdo/Pelvis if stabilizes
Spinal immobilisation	C collar, spinal precautions, log rolls

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SAQ 20 :

1- What are the radiological abnormalities in the above CXR and comment on the most likely diagnosis (3 Marks)

Well circumscribed thick walled lesion with a radiolucent centre in the lower lobe of the right lung consistent with a cavitating lung lesion –

The most likely diagnosis is a lung abscess

2- For the table below, List 3 pathological processes for the above radiological abnormality. Name two etiologies for each pathological process: (9 Marks)

Pathological process	Etiology
Infection	Pyogenic (gram negative) Klebsiella pneumonia, aerobic gram [-] bacilli, Staph aureus TB Fungal
Carcinoma	Primary lung Metastases
Infarction	Pulmonary embolism AVM

3- List your initial antimicrobial therapy (including doses), and justifying each choice. (3 marks)

Antibiotic Guidelines Treatment

Benzylpenicillin 1.2g IV Q4H PLUS Metronidazole 500mg BD for 48hours then 400mg BD PO

If penicillin hypersensitivity use: Clindamycin 600mg IV TDS then 450mg QID PO for total treatment period of 10-14 days

If gram [-] suspected add: Gentamicin 5-7mg/kg IV daily OR Ticarcillin/clavulanate 3g IV QID

If staph aureus suspected or proven use: Di/Flucloxacillin 2g IV Q4H OR Cephalothin 2g IV Q4H

If penicillin hypersensitivity or MRSA proven use: Vancomycin 1g BD IV

Effusions should be drained. Empyema requires specific therapy.

SAQ 21:

1-Describe the key findings on this CXR and give a likely diagnosis. (4 marks)

Widened mediastinum despite AP supine view
Loss of aortic knob contour
Patchy opacities in L lung field ?infective/aspiration
Loss of L costophrenic angle, possible small effusion

Likely diagnosis is aortic dissection

2- List your key management priorities, including the specific drugs doses if relevant? (4 marks)

Analgesia – titrated doses of IV Fentanyl 25-50mcg

Control HR, aim for HR<70 – Metoprolol 1-5mg increments

Control BP, aim for SBP<130 – GTN infusion or SNP

Confirm diagnosis of aortic dissection and expedite transfer to centre capable of definitive management

3- The patient has some further investigations, including the following Arterial Blood Gas:

Suggested answer

Relative hypoxia with A-a gradient of approx 130 – likely causes include aspiration pneumonia/pleural effusion

RAGMA with anion gap 19 – likely cause hypoperfusion of gut from aortic dissection (this supported by raised lactate)

Raised creatinine and elevated potassium – likely involvement of renal A in dissection

4- Outline your immediate management of his elevated potassium. (3 marks)

Cardiac membrane stabilization
Give calcium gluconate 2g IV

Shift K into cells
Give insulin 10 IU IV with 50 mls 50% Dextrose
Give Salbutamol neb 5mg

Aim to increase excretion

Give fluid bolus 250-500ml N/S
Insert IDC
Give Frusemide 40mg IV
If unsuccessful may require dialysis
No role for Resonium

SAQ 22:

Questions:

1- List 4 possible reasons that may have led to this lesion being missed on the initial presentation to ED. (4 marks)

Lack of education/experience of junior medical staff in interpreting CXR
Lack of review of radiology by senior staff
Poor documentation
Incorrect films reviewed on initial presentation

2- Outline your approach to this situation as the Senior Emergency Physician on shift. (6 marks)

1. Ensure appropriate follow-up of current lesion with referral to Respiratory team for further urgent diagnostic work-up
2. Documentation of findings of missed diagnosis in the notes
3. Have a discussion with the patient and family regarding the delay in diagnosis (open disclosure principles) & document discussions with patient and family
4. Notify ED director
5. Notify Radiology director
6. Notify hospital medico-legal department.
7. Refer this case for review through hospital quality assurance program such as M&M or patient safety committees.
8. Advise previous treating doctors of missed diagnosis & possible medico-legal implications

3- List 5 strategies that could be implemented at a departmental level to prevent future missed radiological diagnoses? (5 marks)

Timely reporting of radiology
Notifications of medical staff of abnormal radiology reports
Follow-up up of all pending results by GP after patient discharge
Follow-up process for radiology reports arriving after patient discharge
Copies of all radiology reports automatically forwarded to GP
Audit of results review processes to ensure they are functioning effectively

Reference: ACEM policy on the follow-up of results of investigations ordered by the Emergency Department P54 July 2014

SAQ 23:

Questions:

1- Describe 6 significant findings on this image. (6 marks)

Fractured R glenoid
Fracture extending through neck of scapula
Fracture through distal clavicle with tenting of the skin
Evidence of previous clavicular surgery
Fractured second R rib
No obvious pneumothorax
Humeral head enlocated

2- What is the significance of the above findings? (1 mark)

High impact mechanism required to fracture scapula
~90% risk of concurrent injuries, especially intrathoracic injuries

3- Name 5 other injuries that may be associated with the injury shown in the above X-ray and describe how you would identify them. (10 marks)

Rib fractures – CXR or CT
Lung contusions – CT chest, CXR likely less helpful in early phase < 6 hours
Pneumothorax – CXR or USS
Brachial plexus injuries – Clinical examination showing weakness in nerve root distributions of C5-T1, MRI
C-spine injury – CT C spine
Arterial injury – CTA Chest/Neck

SAQ 24:

1- Complete the table by listing your differential diagnosis for her underlying condition.

Infection:

Tb
EBV
CMV
HIV
Chronic osteomyelitis
Toxoplasmosis
Syphilis

Inflammatory:

Systemic juvenile Rheumatoid a
SLE
Sarcoidosis

Neoplastic:

Hodgkin disease, non-Hodgkin lymphoma, neuroblastoma, acute lymphocytic leukemia, acute myeloid leukemia, and rhabdomyosarcoma.

Lymphoma - hodgkins / non hodgkins
Sarcoma Ewings
Wilms / neuroblastoma
Histiocytosis

Other

Drug related eg phenytoin
Gold
Chronic granulomatous disease

2- What is the likely diagnosis? (1 Mark)

Acute lymphoblastic leukemia

3- List 4 important abnormalities on the FBC to support your answer. (4 Marks)

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Severe normocytic anemia
Severe thrombocytopenia
Severe leukopenia with neutropenia
Pancytopenia
Blast cells seen on smear

4-List 4 other differentials for the above FBC and clinical findings: (4 Marks)

Acquired aplastic anemia

Drugs : NSAIDs, anticonvulsants (carbamazepine), abx, sulfonamide

Chemicals: Benzene, solvents, glue sniffing

Infection: EBV, HIV

Immune: SLE

Paroxysmal Nocturnal Hemoglobinuria

Congenital Aplastic Anemia

Fanconi anemia

Bone marrow suppression/ from other causes infiltration

AML / other subtypes of leukemia

Lymphoma

Ewings sarcoma

Rhabdomyosarcoma

Neuroblastoma

Drug induced pancytopenia

Fanconi Anemia

SAQ 25:

1- List 6 key components of your assessment of this patient in the ED. (6 marks)

Mental state assessment including assessment for acute psychosis, depression
Assessment of suicide risk
Alcohol and drug use – current level of intoxication
Assess for physical injury
Assess for underlying medical condition that may be exacerbating behaviour
Exclude pregnancy
Social History including safety of child in the home
Prior notifications to Department of Child Safety (or equivalent) for this child

2- On attempting to take further history from the patient, she becomes aggressive and starts spitting at staff and throwing chairs around the treatment room. You are unable to verbally deescalate the situation and decide to proceed with chemical restraint of the patient.

List the agents you would use to chemically restrain this patient in the ED. (including doses) (2 marks)

Droperidol
Midazolam
Diazepam
Haloperidol
Olanzapine IMI

3- After you have safely sedated this patient, her mother arrives and becomes angry that you have sedated her child. List the key components of your response to the mother's complaint. (4 marks)

Under Guardianship Act to maintain patient & staff safety
Necessary to allow further mental health assessment of the child
Reassurance of safety processes in place to ensure it was performed safely
Likely timeframe in which child will awake
Allow mother to remain with child whilst in the ED
Documentation of the above in the medical record.

SAQ 26:

1-What is the name of the sign shown on the above ultrasound?

(1 Mark)

Stratosphere or Barcode sign (Evidence of lack of pleural sliding)

2- What is the diagnosis and what is the likely clinical significance in this patient?

(2 Marks)

R sided Tension pneumothorax leading to obstructive shock

3- Complete the table outlining your immediate management priorities and the actions you will take to manage these? (10 Marks)

Clinical Priorities	Action Required
Relief of obstructive shock	<ul style="list-style-type: none">• Needle thoracostomy followed by formal ICC insertion R (N.B Needle Thoracostomy alone is NOT adequate)• Finger thoracostomy• Formal ICC insertion R side
Secure definitive airway	<ul style="list-style-type: none">• Rapid sequence induction• Ensuring pneumothorax is decompressed prior to PPV
Maintain adequate end organ perfusion	<ul style="list-style-type: none">• Aim for MAP of 65mmHg• Minimal use of crystalloids• Early use of blood products /ROTEM as required
Definitive investigations/ Assessment for other injuries	<ul style="list-style-type: none">• CT Head / C-Spine / Thorax / Abdomen / Pelvis• Repeat FAST scan once chest decompressed
Supportive measures	<ul style="list-style-type: none">• Adequate analgesia and sedation• Psychosocial support for family / NOK

SAQ 27:

1- List 8 findings on the ECG that could support a diagnosis of PE: (8 Marks)

Sinus tachycardia
Atrial arrhythmia
Non-specific ST-T wave changes
P pulmonale
RAD
LAD
RBBB
R V strain patten
S1QIIIITIII

2- A CTPA has been performed which confirms a saddle shaped pulmonary embolus.

What are the 3 definitive management options available for this patient.

List the 1 indication and 1 contraindication for each option? (9 Marks)

1. Thrombolytics
 - a. Indications: Massive PE with haemodynamic compromise, delay to alternate therapy
 - b. Contraindications: standard for thrombolytics, major surgery would be important (not joints though)
2. Thoracotomy with embolectomy
 - a. Indications: as per thrombolytics + access to CTS
 - b. Contraindications: no access to timely CTS surgeons
3. Interventional radiology with embolectomy/clot retrieval
 - a. Indications: access to IR, ability to lie flat (often need to be intubated)
 - b. Contraindications: Contrast allergy (has had CTPA so not relevant), renal failure (again relative), no access to IR.