

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

Facility/hospital/clinical service name

# Metro North Hospitals ACEM Fellowship Trial Examination

2016.2

Short Answer Questions

SAQ Paper

## Answers Only

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## SAQ 1 Long Question (31 marks)

Questions:

**1. List 6 steps in your preparation for this patient's arrival. (6 marks)**

Two teams – mother & baby

Immediate call to O&G & Paediatrics

Ensure management of the rest of the department.

Prepare equipment for:

Maternal resuscitation (Airway trolley, Drugs, Wedge for L lateral position)

Neonatal resuscitation (Resuscitaire neonatal trolley, airway equipment, drugs)

Peri-mortem C section kit

Alert theatres, pathology (blood bank), radiology/ultrasonographer +/- ECHO

On arrival, CPR in ongoing. The ambulance crew report that the patient was found collapsed with no pulse. Husband commenced CPR & ambulance arrived within 10 minutes. Initial rhythm was VF with a single shock required for ROSC. Two further unsuccessful attempts at DCCV occurred enroute for recurrent VF but the current rhythm is asystole.

**2. What are the key steps in the ongoing management of this patient in the ED, list five (5)? (5 marks)**

Continue CPR ratio 15:2 at 100 beats/min

Provide oxygenation via BVM 15L/min, consider LMA or intubation

Adrenaline 1mg every 2<sup>nd</sup> cycle

Prepare for peri-mortem C/section (or resuscitative hysterotomy)

Seek and treat reversible causes

(As per ALS algorithm for asystole)

**3. What are the indications for a resuscitative hysterotomy in the ED? (3 marks)**

Maternal cardiac arrest

Indications: within 15 minutes of arrest (or detectable FHR if longer downtime)

Uterus palpable above umbilicus or known gestational age >20-24weeks

**4. Briefly describe how a resuscitative hysterotomy is performed. (7 marks)**

Prep skin with iodine (if time permitting).

Vertical incision from pubis to umbilicus.

Clip to peritoneum, use scissors to open peritoneum, from pubis to umbilicus.

Vertical incision in uterus (large), try to avoid the bladder.

Delivery of baby:

Place your hand through the incision into the uterine cavity.

Deliver baby's head

May require pressure on uterine fundus.

Clamp and cut umbilical cord.

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Delivery of placenta:

Scoop it out with your hand.

Ongoing gentle traction on cord.

Given Syntocin 30units

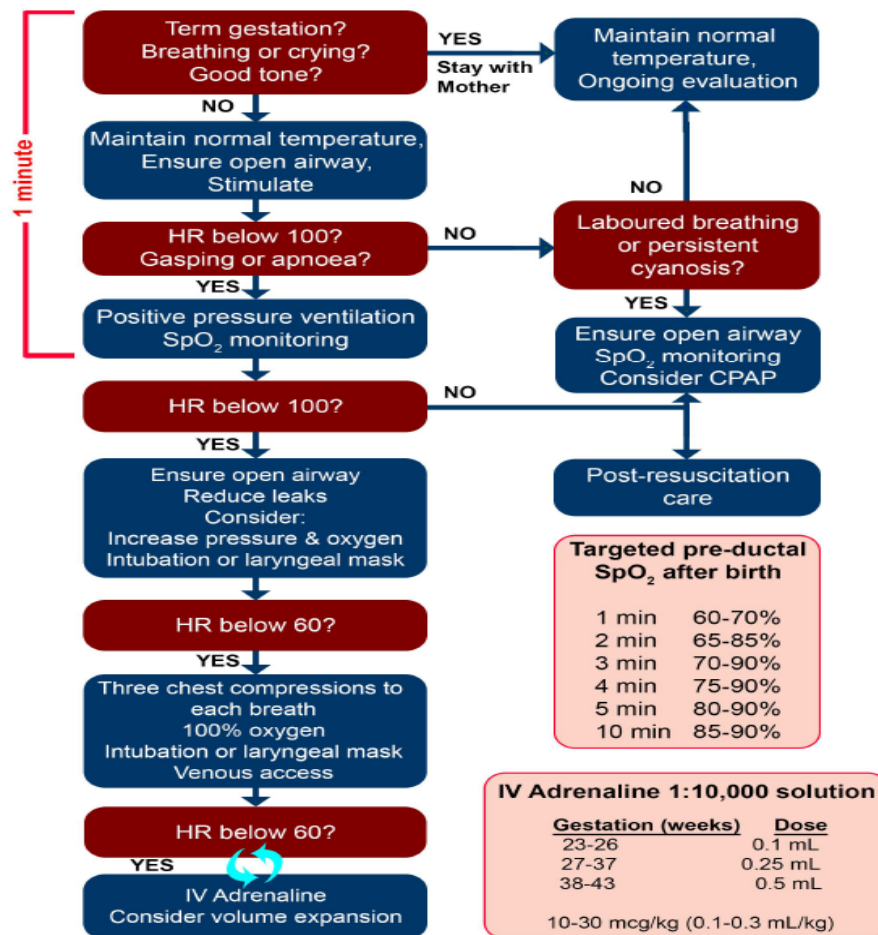
Uterine fundal massage.

Pack uterus (Keep note of number of packs used).

Ref: <http://stemlynblog.org/peri-mortem-c-section-at-st-emlyn/>  
<http://www.ncbi.nlm.nih.gov/pubmed/%2021712662>

Following resuscitative hysterotomy, the mother has achieved ROSC almost immediately and is in the care of your obstetric colleagues. On delivery of the infant there are no signs of life. You have been asked to assist with the resuscitation of the neonate.

5. Outline your approach to the resuscitation of the neonate with respect to each of the following areas as listed in the following table.



(10 marks)

2 marks for each box.

Pass mark: 19/31

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## SAQ 2 (12 Marks)

Questions:

1- List 2 radiological abnormalities on this X-ray and one negative finding?

(3 marks)

**Thickening of epiglottis (thumb printing)**

Loss of cervical spine lordosis

**Normal prevertebral soft tissue spaces**

No visible FB in airway

2- List 4 likely organisms that cause this condition in this patient.

(4 marks)

**Haemophilus influenzae b (Hib)** (must have this for full marks)

H.parainfluenzae

Strep pneumonia

Group A Strep (pyogenes)

Staph aureus

Atypical organisms (Mycoplasma)

3- List 5 immediate management priorities in the ED?

(5 marks)

Nurse in position of best comfort & avoid distressing the patient

Call for urgent assistance from Anaesthetics & ENT

Prepare to manage **potential airway obstruction** (difficult airway equipment including cric kit, but aim to intubate in OT with awake intubation unless acute deterioration)

Analgesia – IV Paracetamol 1g, Morphine 0.1mg/kg titrated to analgesia but not drowsiness

Antibiotics – Ceftriaxone (or Cefotaxime) 2g bd IV

**Pass mark: 8/12**

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**SAQ 3: (13 Marks)**

Questions:

- 1. What categories of PPE should be provided to staff, list two (2)?** **(2 Marks)**

(needs these two broad categories, with examples)

- a. Against body fluid exposure – eg glasses, gloves, aprons/gowns
- b. Against extreme environments – eg boots, dedicated long sleeve clothing, hats/helmets, sun and cold protection

- 2. What monitoring and alarms are required, List four(4)?** **(4 Marks)**

(4 out of these 5 needed. This taken specifically from ACEM guidelines)

Continuous ECG  
Pressure monitoring – invasive and non-invasive  
Patient Oxygenation with continuous pulse oximetry  
Patient Ventilation with wave form capnography  
Ventilator alarms including high pressure and disconnection

- 3. What non-clinical equipment is needed, List four (4)?** **(4 Marks)**

(4 of these, or other sensible suggestions)

Communication – phones  
Documentation and pens  
Taxi vouchers  
Spare batteries for equipment  
Torches and/or head torches

- 4. What clinical governance review processes are required?** **(3 Marks)**

(Can be formatted any way, but needs to include an audit of events and using this to feedback into future practice)

- Audit of cases
- i. Tasking
  - ii. Staffing mix and seniority
  - iii. Equipment performance
  - iv. Clinical decisions and patient outcomes
  - v. Closed loop of feedback to staff and to inform future practice

**Pass mark: 8/13**

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**SAQ 4: (10 Marks)**

- 1. Describe the photo: (1 Mark)**

Unilateral erythematous swollen knee joint. No visible wounds, no rash.

- 2. List 3 differential diagnosis for the above presentation? (3 Marks)**

- a. Septic joint
- b. Gout
- c. Gonococcal arthritis
- d. Auto-immune arthritis

- 3. Under an aseptic approach, an USS guided joint aspirate is taken. Complete the following table with the expected pathology findings: (4 Marks)**

One mark for each column completed ie appearance, WCC and %PMN

Analysis of synovial fluid

Diagnosis / fluid type	Findings	WCC (10 <sup>6</sup> /L)	% PMN
normal	clear, viscous, pale yellow	0 to 200	less than 10%
noninflammatory	clear to slightly turbid	200 to 2000	less than 20%
inflammatory	slightly turbid	2000 to 50 000	20% to 70%
septic	turbid to purulent	greater than 50 000	greater than 70%

- 4. The synovial fluid result suggests septic arthritis. What antibiotics do you give while awaiting culture results? (2 Mark)**

Flucloxacillin 2g IV, 6-hourly, or

If penicillin allergic Cephazolin 2g IV, 8-hourly, or

Vancomycin 1.5g IV, 12-hourly if immediate hypersensitivity

Gonococcal arthritis is considered in sexually active males, but in the absence of rash or urinary symptoms this is less likely, and he is more likely to have a standard gram-positive infection ie Staph Aureus or Strep. If cultures or Gram stain suggest gonococcus then should be treated for disseminated gonococcus with iv ceftriaxone. eTG recommends empiric therapy only with flucloxacillin until cultures come back to direct therapy.

Ref: eTG antibiotic and rheumatology sections

**Pass mark: 7/10**

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**SAQ 5: (20 Marks)**

- 1. Explain your initial approach to this scenario, and what your initial steps should be to diagnose this problem: (4 marks)**

High index of suspicion for a PTX given obstructive pathology, and priority is to seek and treat.

Immediately take patient off ventilator, and place on a hand bag device (BVM, etc). Should be able to feel if the pressure is "high" with bagging. Continue to bag.

Immediately ensure patient is deeply sedated and paralysed.

Obtain CXR to confirm: ETT position, presence of PTX, presence of hyperinflated lungs, and fix accordingly (reposition, decompress, prolonged expiratory pause to allow for passive exhalation).

Once convinced no patient factors, re-introduce ventilator, increasing I:E Ratio, and reducing Resp rate.

- 2. Can you list up to 3 potential equipment problems and 3 potential patient problems that may have resulted in this alarm, and outline the initial steps to manage those problems?**

**(12 marks)**

<u>EQUIPMENT</u>	<u>MANAGEMENT</u>
ETT migrated R Main Bronchus	Reposition ETT
ETT Blocked/narrowed	Suction and clear ETT/change
Ventilator I:E ratio too low	Increase I:E ratio to allow longer for expiration
<u>PATIENT</u>	<u>MANAGEMENT</u>
Dynamic Hyperinflation	Increase I:E Ratio and allow pause for passive exhalation. Reduce PEEP to 0
Pneumothorax	Decompress to avoid tension
Ventilator Dysynchrony	Deeply sedate and parlyse
Bronchospasm	Continue Bronchodilator therapy

- 3. Outline the principles behind ventilating a person with severe asthma:**

**(4 marks)**

Ventilation should be a last option management in Asthmatics. It is very difficult to replicate the abnormal physiology of an asthmatic with ventilation.

Principles:

I:E Ratio > 1:3

Low rate (~8/min)

Tolerate Hypercapnoea

Avoid hypoxia - FiO2 100%

Tidal Volume (5-6ml/kg)

PEEP 0-2mmHg - avoids dynamic hyperinflation and reduces risk of auto-peep

Frequent pauses from ventilator

**Pass mark: 12/20**

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## SAQ 6: (17 Marks)

Questions:

**1. List 4 different causes of a broad complex tachycardia (4 Marks)**

- Ventricular Tachycardia
- SVT with aberrant conduction due to bundle branch block
- SVT with aberrant conduction due to the Wolff-Parkinson-White syndrome
- Pace-maker mediated tachycardia
- Metabolic derangements e.g. hyperkalaemia
- Poisoning with sodium-channel blocking agents (e.g. tricyclic antidepressants)

**2. List 4 clinical features that increase the likelihood of VT (4 Marks)**

- Age > 35
- Structural heart disease
- Ischaemic heart disease
- Previous MI
- Congestive heart failure
- Cardiomyopathy
- Family history of sudden cardiac death (suggesting conditions such as HOCM, congenital long QT syndrome, Brugada syndrome or arrhythmogenic right ventricular dysplasia that are associated with episodes of VT)

**3. List 6 ECG features that increase the likelihood of VT (6 marks)**

- Absence of typical RBBB or LBBB morphology
- Extreme axis deviation ("northwest axis")
- Very broad complexes (>160ms)
- AV dissociation
- Capture beats
- Fusion
- Positive or negative concordance throughout the chest leads
- Brugada's sign
- Josephson's sign
- RSR' complexes with a taller left rabbit ear

**4. List 3 medications used to treat stable VT (3 Marks)**

- Amiodarone 5mg/kg
- Procainamide 50mg/min
- Lignocaine 1mg/kg
- Sotalol 1mg/kg
- Magnesium 10mmol

**Pass mark: 10/17**

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## SAQ 7: (10 Marks)

### 1. List 3 steps to approach this situation? (3 marks)

Answer:

- Need to urgently contact patient and inform patient of missed diagnosis and need for further imaging of c-spine (with immobilisation).
- Inform patient he should not drive due to his seizure, and will need formal clearance to drive
- Notify director and consider formal report for M&M review or similar- need to explore why C-spine imaging was not initially undertaken (how was treating doctor able to clear c-spine clinically in setting of intoxication?)

### 2. You contact the patient, and advise him of the result. He informs you he lives 100km from the nearest town with a CT scanner.

#### What are the 3 main considerations for this patient? (3 marks)

Answer:

- Patient should have c-spine immobilised until further imaging can confirm stable fracture and absence of other injury
- Patient will need transport to facility- ambulance is only practical option but depending on location this may be difficult to arrange
- Will need to liaise with local clinician who can continue to co-ordinate care, arrange imaging, transport and then referral as require- this may be local GP or hospital doctor

### 3. The patient is reluctant to undergo further imaging as he is the local school bus driver and does not want to leave the bus route uncovered.

#### What 2 significant medico-legal issues does this case raise? (4 marks)

Answer:

- Missed diagnosis of potentially serious injury- need for open disclosure, incident reporting and review of processes to avoid future similar missed injury
- Patient privacy and confidentiality- usually this is paramount however in this situation the risk to the public (potential further seizure whilst driving school bus) outweighs the need to uphold confidentiality. Australian and New Zealand fitness to drive guidelines require patients to notify Driving License Authorities of seizure disorder, and will require a seizure-free period before resumption of driving, and will exclude commercial licenses. A notification will need to be made to the relevant authority if the patient insists on driving, including potentially liaising with local police.

**Pass mark: 6/10**

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**SAQ 8: (22 Marks)**

Questions:

**1. List 2 abnormalities on the CXR. (2 marks)**

Loss of left hemi-diaphragm and meniscus sign in left lung field suggesting left pleural effusion.  
Fractured left 7<sup>th</sup> rib (this is subtle and may not project well on paper so is not pass/fail)

**2. List five differential diagnoses, with justifications based on the information above. (10 marks)**

Diagnosis	Justification
Traumatic haemothorax	Fractured rib, falls risk, anti-coagulated. Need to consider elder abuse.
Bacterial pneumonia with para-pneumonic effusion	Debilitated pt, at risk for aspiration
Neoplasm (primary or metastatic) with effusion	Advanced age increases risk
Pulmonary embolism	Possible bed-bound and thus at risk, possible non-compliance with anti-coagulation
CCF with unilateral effusion	History of IHD and HTN

**3. As you conduct a thorough examination of the patient, you discover some pressure areas on her back and buttocks.**

**List six risk factors for elder abuse. (6 marks)**

- Cognitive impairment
- Physical impairment – unable to defend oneself
- Dependence on a carer
- Social isolation
- Chronic illness
- Social stressors

**4. State four management priorities now. (4 marks)**

Appropriate medical management – analgesia +/- investigation of underlying cause of effusion.  
Discussion with care-givers and next of kin regarding clinical findings/concerns  
Careful documentation of above.  
Admission under appropriate medical team for on-going management and consideration of care placement/increased home services.

**Pass mark: 13/22**

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## SAQ 9: Long Questions (25 marks)

Questions:

**1. Describe the key features of the above photographs:**

**(5 marks)**

Distressed infant

Erythema to face, chest, abdomen, perineum and front of both legs

Evidence of extensive DESQUAMATION to upper chest, right arm, abdomen, perineum and right leg

No involvement of mucous membranes

Difficult to give a % as can't see back, extensive desquamation

**2. What is the most likely diagnosis, including the likely pathological process?**

**(2 marks)**

Most likely Staphylococcal Scalded Skin Syndrome – exotoxin from Staph Aureus infection

**3. List 5 other possible causes for the above presentation:**

**(5 marks)**

Stevens Johnson syndrome- TENS (has mucosal involvement)

Burns- chemical, thermal

Non-accidental injury

Dermatitis- contact/exfoliative

Necrotising fasciitis

Omphalitis

Staph or strep infection spreading (without exotoxin)

**4. List 3 possible complications from the above condition:**

**(3 marks)**

Anticipate complications with loss of skin barrier

Fluid losses

Hypothermia

Sepsis

**5. In point form, List your management steps, including any drugs, doses and end points. (10 marks)**

Fluid resuscitation- normal saline if markers of shock – 20mls/kg normal saline

Check BSL- ensure normoglycemia

Temperature control- potential for hypothermia- cover and keep warm; monitor core temperature

IV antibiotics- Flucloxacillin 50mg/kg  
- Send swab for M/C/S to guide further Abs

Analgesia- will need IV opiates morphine 0.1mg/kg doses, anticipate need for infusion

Skin care- erythematous skin- emolient  
- blistered areas- treat as burn- cover with paraffin soaked guaze

Fluids and electrolytes  
Ongoing fluid resuscitation with normal saline- Parklands 2-4ml/kg/% burns

Insert IDC- monitor urine output- aim 1ml/kg/hr

Anticipate electrolyte losses- monitor for hyponatremia

Nasogastric tube- early enteral nutrition in ICU

**Pass mark: 15/25**

## SAQ 10: Long Questions (35 Marks)

1. List 6 possible causes for stridor in paediatric population (other than croup):  
(6 Marks)

Bacterial tracheitis  
Epiglottitis  
Retropharyngeal abscess  
Laryngeal FB  
Angioneurotic oedema  
Subglottic haemangioma  
Laryngomalacia

2. State five indications for intubation in this scenario. (5 marks)

Exhaustion from increased work of breathing  
Hypercapnoeic (type II) respiratory failure  
Hypoxaemic (type I) respiratory failure  
Decreased level of consciousness and unable to protect airway  
Imminent complete airway obstruction

3. As you make your way hurriedly into the department, you advise the registrar to prepare for rapid sequence induction and intubation.

Please complete the following information. Please provide doses and sizes for any drug or equipment used. (Total 13 marks)

Answers:

<b>Preparation of patient</b>	Keep pt calm and upright for as long as possible
	Optimise medical management – Adrenaline neb 5mg, Dexamethasone 0.3mg/kg PO/IV
	High-flow oxygen (potentially 2L/kg) via nasal prongs
	IV access (may delay until last minute)
	Explanation to parent
<b>Equipment</b>	Bag Valve Mask (Child size)
	Laryngoscope with Miller blade (size 2) and Macintosh blade (size 2)
	ETT 4.0-4.5 and one size <i>below</i> due to anticipated laryngeal oedema
	Bougie
	Suction
	Laryngeal Mask Airway (size 2)
	Surgical airway equipment – needle cricothyrotomy

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<b>RSI Drugs</b>	Ketamine 2mg/kg or Fentanyl 2-5 mcg/kg or Propofol 1-2 mg/kg
	Suxamethonium 1-2 mg/kg or Rocuronium 1.2 mg/kg

**4. The patient is successfully intubated in your ED. As you prepare the patient for transfer to the Paediatric ICU, the ventilator starts alarming that the airway pressures are high.**

**List six causes of high airway pressures in this patient. (6 marks)**

Displacement of ETT  
Blockage of ETT (eg secretions)  
Kinking of circuit  
Bronchospasm (eg: anaphylaxis to induction drugs or part of viral croup)  
Pneumothorax  
Inadequate patient sedation

**5. List 5 anatomical airway difference in paediatric population in comparison with adult airway:**

**(5 Marks)**

Larger tongue  
Larynx more cephalic  
Increase compliance of chest wall  
Bulging occipital process (Flexed neck)  
Smaller mandible  
Narrowest part at cricoid cartilage  
Smaller diameter at airway, therefore, higher resistance to airflow.

**Pass mark: 20/35**

## SAQ 11 (13 Marks)

### 1. What is the diagnosis and give supporting evidence. (2 Marks)

Diagnosis – Iron deficiency anaemia secondary to menorrhagia.

Evidence – Low Hb, haematocrit and MCV

2. She is assessed by a registrar and the decision is taken to admit her for a blood transfusion. Consent is obtained and 3 units of cross matched blood requested.

The transfusion is commenced in the Emergency Department. The first unit is charted to be given over 1 hour.

Soon after the transfusion is commenced she complains of pain at the site of her IVC, back pain and dyspnoea. She goes on to rapidly develop tachycardia, hypotension and fever. On examination she has an audible wheeze and widespread rales. Her GCS is 14.

### What is the most likely diagnosis and list 4 complications which may occur? (5 Marks)

Haemolytic transfusion reaction (sepsis secondary to contaminated blood product may be considered a possibility – complications are similar. General statement of sepsis without qualifying it as sec to contamination NOT acceptable as an answer.)

May be complicated by:

DIC

Renal failure

Pulmonary Oedema

ARDS

Death

### 3. List 2 immediate (1<sup>st</sup> hour), 2 medium term (hours to days) and 2 long term priorities in dealing with this situation? (6 Marks)

#### Immediate:

Stop transfusion

Treat shock – fluid, vasopressors

Oxygen / support ventilation

#### Medium term:

Investigate cause – remaining blood product and fresh sample from patient sent for analysis (would be acceptable as immediate)

Clarify circumstances with registrar and nursing staff while providing support

Open disclosure to patient and family

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**Long term:**

Ongoing disclosure

M&M

Education re transfusion rate and reactions

Liaise with blood service to ensure safe practices re storage and crossmatch as per accepted guidelines

\*Any sensible answers in these fields accepted.

**Pass mark: 8/13**



## SAQ 12: (20 Marks)

### 1. Please name 4 pertinent findings on this CT. (4 Marks)

- Large ring enhancing lesion to left frontoparietal hemisphere
- Surrounding vasogenic oedema is evident
- Mild mass effect with a minor degree of midline shift
- Irregular hypodense centre representing likely necrosis
- Irregular thick margins with hyperattenuation (or heterogenous enhancement of the margin)
- Likely infiltration beyond the visible mass on the left border
- Size unable to define: No calipers provided

### 2. Please provide 6 differential diagnoses in order of priority. (6 Marks)

- Primary malignancy (Glioblastoma Multiforme most likely, others include anaplastic astrocytoma)
- Cerebral metastasis (Lung, Breast,
- Cerebral abscess
- Primary CNS lymphoma
- Cerebral toxoplasmosis
- Cerebral Tuberculosis
- Subacute cerebral infarction
- Tumefactive demyelination

### 3. List your management priorities in the Emergency Department (5 Marks)

- Analgesia with dose
- Steroid Therapy (Must name drug and dose and route)  
Dexamethasone 4-8mg stat then 4mg QID IV
- Consultation with neurosurgery team for admission and further management
- Seizure prophylaxis  
Will accept either phenytoin load 15-20mg/kg or leviteracetam 20-30mg/kg
- Social support for patient and family

### 4. Please provide your approach in breaking bad news to this particular patient. (5 Marks)

- Appropriate setting: quiet area is desirable
- Ask if she wants any family or NOK present
- Having other support staff present: Senior RN or Social Worker
- Use of a 'Warning Shot'
- Explain findings on the CT and the likely diagnoses in layman terms
- Explain the next step in her treatment will be guided by the neurosurgical team
- Use of silence for news to sink in
- Offer tissue and water
- Social worker to assist with any social issues
- Answer any questions posed by patient and family

Will accept any combination of the above

**Pass Mark is 14/20**

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### SAQ 13 (15 Marks)

Questions:

- 1. List 5 patient factors that make this an inappropriate response by the ICU Registrar. (5 marks)**

Relatively young age of patient  
Lack of co-morbidities  
ROSC achieved  
Possible reversal cause (eg acute MI) –not futile  
Inability to prognosticate about neurological outcome in first 72 hours.  
Therapeutic hypothermia may affect prognosis.  
Brain death cannot be pronounced until > 72 hours

- 2. Outline your approach to the ongoing medical management of this patient. (5 marks)**

Commence inotropes – Adrenaline infusion & titrate to MAP > 60  
Increase PEEP to 5-10cm H<sub>2</sub>O to improve oxygenation  
Cooling of patient to 34-36 degrees  
Advocate for patient to go to cath lab as post-VF arrest.  
Attention to post-resuscitation cares (sedation, IDC, Invasive monitoring)

- 3. Outline your approach to dealing with the ICU Registrar. (5 marks)**

Advise ICU Registrar that their request is not appropriate for this patient for the above reasons.  
Request that they DO NOT speak to the family of this patient.  
Call ICU consultant to request urgent attendance in ED to discuss the case.  
Request that they refrain from further involvement with this patient until their consultant has arrived.  
Provide education to the registrar regarding brain death processes.  
Provide local brain death protocol for them to review.  
Make a formal complaint to supervisor of training regarding need for education of this ICU registrar regarding brain death diagnosis.

**Pass mark: 10/15**

**SAQ 14 (22 Marks)**

Questions:

**1. List 2 abnormalities in the chest x-ray**

**(2 marks)**

LLL consolidation with effusion and air bronchograms in the mediastinum. Collapse of the LLL with loss of volume in the L lung.

**2. Give 4 possible aetiologies and name one radiological feature that may support each of these aetiologies:**

**(8 Marks)**

Viral pneumonia	Patchy bilateral infiltrates
Mycoplasma pneumonia	Ground glass (homogenous acinar consolidation)
Strep pneumonia	Round consolidated area or para pneumonic effusion
Staph aureus	Pneumotoceles, lung abscesses or round consolidation

**3. She worsens and remains hypoxic 91% despite 15L with a re-breather mask. What are the options for escalation of respiratory support and name two advantages and 2 disadvantages of each.**

**(12 marks)**

	Advantages	Disadvantages
Hi flo nasal prongs	Easy comfortable, CPAP	No protection of airway, Variable supply of PEEP
Nasal CPAP	Good seal, no leak, Continuous PEEP	Not well tolerated, often requires sedation, no airway protection
BIPAP	Inspiratory support for work of breathing as well as PEEP	No airway protection Requires PICU, risk of barotrauma
Intubation and Ventilation	Inspiratory and expiratory support Protection of airway	Requires sedation Hypotension with sedative agents, risk of barotrauma

**Pass mark: 15/22**

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## SAQ 15 (10 Marks)

1. List four (4) abnormalities in the ECG: (4 Marks)

Answer

- **Sinus tachycardia with 2 supraventricular complexes,**
- Rate 108
- **Left axis deviation**
- PR normal (160ms)
- **Broad QRS** (non specific interventricular conduction delay (not characteristic of LBBB or RBBB) – appears wider than actually is at some points due to upsloping of ST segments
- **Widespread ST depression I, II, aVF and V2-V6 T-wave inv aVL**
- **Marked ST elevation in aVR (>3mm at the J point)**
- STE aVR>V1

2. What is the significance of the ECG changes in this case? (2 Marks)

Answer

- Strongly suggestive of Left main coronary artery occlusion or severe multi vessel disease
- STEMI equivalent
- Needs urgent reperfusion (Cath lab in this case)

3. List four (4) drugs (with doses) needed within the first hour of arrival to ED (4 Marks)

Answer

- Oxygen : titrated to keep SaO<sub>2</sub> 92-97%
  - Aspirin : 300mg Stat
  - Heparin 5000iu stat IV
  - Fentanyl 1mic/kg or morphine 0.1mg/kg
  - Antiemetic – Maxalon 10mg IV, ondansetron 4-8mg IV
- (Clopidogrel or similar – in discussion with cardiology given potential need for CABG any prefer to withhold, GTN if BP permits)
- Thrombolysis ( Not indicated in this case as have cath lab on site – unless significant delay anticipated)

**Pass mark: 7/10**

**SAQ 16: (14 Marks)**

Questions:

- 1. You assemble a trauma team and allocate roles to manage this patient. What are the immediate priorities on his arrival, list five (5)?**

**(5 Marks)**

Assess for source of haemorrhage- CXR/Pelvic Xray, EFAST
Gain large bore iv access- trauma panel bloods
Control external haemorrhage- bandaging/splinting- pelvis and limbs
Damage control resuscitation- early bloods products, avoid crystalloid, permissive hypotension
Control airway- intubate/ventilate with reduced titration of sedative medications

- 2. You perform a pelvic X-ray as part of your initial trauma workup and assessment which is included in the props booklet**

**List 2 radiological abnormalities and comment on the clinical interpretation of the above presentation: (4 Marks)**

Poorly aligned trauma supine film, binder in situ, monitoring leads
Butterfly segment of pubis
Sacral #
Gas in tissues
Acetabulum intact. SI joints intact
Femurs nad (captured in image)

Interpretation:

Major compound pelvic injury with haemodynamic compromise suggestive of arterial injury and ongoing blood loss
--

- 3. List five management priorities specific to the patient's pelvic injury:**

**(5 Marks)**

Haemorrhage management with MTP/guided transfusion- permissive hypotension
Definitive care depending on local resources- OT for preperitoneal packing and exploration given compound injury, potentially IR following this
Aim for normothermia
Analgesia
Broad spectrum antibiotics/ADT given compound injury
Social work/family update

**Pass mark: 9/14**

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### SAQ 17: (13 Marks)

Questions:

**1. List 3 abnormalities on the image (3 marks)**

- . Lacerated sclera
- Uveal prolapse
- Misshapen pupil

**2. List 2 relevant negative findings (2 mark)**

- No hyphema
- No signs of extraocular trauma

**3. What is the diagnosis (1 mark)**

- Globe rupture

**4. What further investigation(s) would you consider and what is your justification: (2 marks)**

- Safe modality (CT/USS) to locate FB.
- MRI incorrect and contraindicated.
- Plain film not appropriate as investigation in a tertiary ED.

**5. List 5 management steps with route and doses where appropriate (5 marks)**

**BOLD to pass**

- **Immediate ophthalmological referral** (0.5)
- Elevate head of the bed (0.5)
- Eye shield (0.5)
- ADT (0.5)
- IV antibiotics. (broad spectrum IV Pip taz or similar broad spectrum cover with appropriate dose) (1)
- **Analgesia** (IV with appropriate dose opiate) (1)
- **Antiemetics** (IV appropriate dose) (1)

**Pass mark: 8/13**

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## SAQ 18: Long Question (30 marks)

You are working in the retrieval service when you receive a call for advice from a junior medical officer who is working in a small rural hospital 300km from the tertiary centre. They have a 34 year old male patient who has sustained burns to their chest and arms whilst lighting a fire on their farm.

**1. List 2 different methods that could be used to estimate the TBSA% of this patient's burns. (2 Marks)**

- Lund and Browder chart
- Rule of nines
- Palmar surface

**2. What key features of this patient's assessment would make you concerned for the presence of airway burns. (5 Marks)**

- Stridor
- Hoarse voice
- Carbonaceous sputum
- Singed facial hair
- Nasal/oral burns
- History of fire in a confined space

**3. List your advice to the junior doctor about whether IV fluids would be indicated for this patient? (3 Marks)**

- If >15-20% TBSA for adult patient
- If coexistent traumatic injuries
- If delayed presentation
- If inhalation injury

**4. If fluids are required, outline your advice about how to calculate the initial fluid requirements for this patient. (4 Marks)**

- Modified Parkland Formula
- $3-4\text{mLs} \times \text{TBSA}\% \times \text{Weight (kg)}$
- 1/2 Total Fluid Volume to be given in first 8 hours post burn
- 1/2 Total Fluid Volume to be given over next 16 hours

**5. List 6 criteria that would indicate that this patient requires referral to a burns centre for ongoing management. (6 Marks)**

- Burns > 10 % TBSA in an Adult (partial and full thickness)
- Full thickness burns > 5% TBSA

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- Burns to special areas (eg face, hands, feet, perineum, genitalia, and major joints)
- Circumferential burns
- Burns in the presence of major trauma or significant co-morbidity
- Unable to managed in the current level of hospital

**6. Complete the table by listing 5 immediate and 5 long term complications that may occur from this patient's burns. (10 marks)**

Immediate

Infection/Sepsis

Fluid loss

Hypothermia

Rhabdomyolysis

Acute renal failure

Compartment syndrome

Chest rigidity & hypoventilation from eschar

Long term

Cosmetic/Scarring

Loss of function

Loss of income/employment

Contractures

Psychological

Restrictive chest wall/lung disease

**Pass mark: 18/30**



### SAQ 19 Long Question (33 marks)

1. **List 5 abnormalities in the above VBG, including any calculations, with a brief explanation of the significance of each.** (5 Marks)

Corrected Na: 128 Hyponatremia (probably from chronic induced vomiting)

Anion gap  $(117-43-19)= 55$  HAGMA (Likely DKA)

Delta ratio:  $(55-12)/(24-19)=$  Very high  $>2$  therefore HAGMA and Metabolic alkalosis

Critical hypochloremia (Hypochloremic metabolic alkalosis from vomiting)

Critical Hypocalcaemia (Chronic eating disorder/malnutrition)

Hyperglycemia - DKA

Low pCo<sub>2</sub>: respiratory compensation

Urea/ Creatinine ratio=  $< 1$  Intra-renal failure

Mix HAGMA and hypochloremic metabolic alkalosis and resp compensation

2. **Her ECG is reproduced and included in the props booklet.**

**List 4 ECG abnormalities and two likely causes for these changes.**

(6 marks)

Answer:

**Bradycardia** - Rate 50

**Long QT interval**

T wave flattening and inversion

U waves

Characteristic of **hypokalaemia, hypocalcaemia**

3. **List eight (8) important management steps for the above patient including any drugs required and endpoints of therapy.**

(8 Marks)

Multi-disciplinary team approach including ICU, medical, psychiatric and social worker.

Treat shock with 10ml/kg Normal saline, aim for Systolic  $> 90$  and MAP  $>65$  and Urine output 0.5 ml/kg/hr with caution of correcting hypernatremia very quickly

Insulin infusion at 0.05-0.1 U/kg, aim to slow correction of hyperglycaemia

Electrolyte correction:

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KCl 40 mmol

Mg 10 mmol IV

Ca Gluconate 10mL 10%

Treat hypothermia with passive rewarming (Bear hugger)

Thiamine 100 mg TDS and multivitamin supplement.

**4. List 2 potential ethical and legal pitfalls that could be anticipated in the management of this patient: (2 marks)**

Patient might refuse the above treatment or lack insight into her condition, therefore **lacking capacity** to consent.

Under **duty of care** principle, this patient could be kept in hospital to receive the above treatment even if she is unable to consent.

Patient may try to leave requiring escalation of restraint. (Verbal de-escalation with input from her NOK, family and Psych team, next step will be pharmacological restraint as last resource.)

**5. List 6 common physical symptoms that a patient with anorexia nervosa may present with to the ED. For each list one potential underlying cause. (12 marks)**

Answer:

Chest pain - Cardiomyopathy, arrhythmias secondary to electrolytes

Palpitations - brady/tachycardia, arrhythmias

Constipation - dehydration, hypocalcaemia

Abdo pain - pancreatitis post binge, secondary to ileus

Collapse or syncope - hypoglycaemia, hypocalcaemia, anaemia

Fractures - secondary to osteopenia

Weakness - electrolyte abn hypokalaemia, hypocalcaemia, hypoglycaemia, peripheral neuropathy, hypothyroidism

**Pass mark 20/33**

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## SAQ 20: (20 Marks)

Questions:

**1. Name factors that can influence the severity of an electrical injury and its significance. (8 Marks)**

Voltage level:	High voltage > 1000 Volts are high risk injuries
Current level :	>2 amps causes burns and > 10 amps causes asystole
Current type:	AC more likely to precipitate VF compared with DC AC is considered 3x more dangerous than DC due to its ability to cause tetanic muscle contractions that prolongs contact of victim with the source.
Pathway of current:	Pathway determines type and severity of injury Vertical pathway most dangerous as all organs are in the line of injury Horizontal pathways usually spares brain but can still be fatal due to heart, respiratory muscle and spinal cord involvement
Duration of current:	Longer the duration likely the more severe the injury

**2. Please name types of injuries that can be sustained in this patient and example of each type. (8 Marks)**

Thermal Burns

Burns to skin: varying thickness

Burns to eyes

Compartment syndrome

Blast Trauma

Blunt trauma to head / spinal / chest / abdomen from the blast

Head Trauma

Spinal Trauma

Chest Trauma: Haemothorax, Pneumothorax, Rib Fractures, Lung Contusions, Cardiac Contusions

Abdominal / Pelvic Trauma: Any type of visceral injuries

Bony Injury: Any type of significant bony injury from the impact of the blast and being thrown.

Tympanic Membrane rupture

Cardiovascular Injury

Cardiac dysrhythmias: Malignant (VF, Systole) to other conduction disorders

Direct myocardial necrosis in high voltage or alternate currents.

Neurological Injury

Hypoxic brain from cardiac arrest

Continuous tetanic contractions

Seizures

Spinal cord injuries

Crush Injury / Acute renal failure / Rhabdomyolysis from ischaemia

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**3. Please give 4 indications for the use of telemetry in a patient with an electrical injury?**

**(4 Marks)**

High voltage injury (>1000 volts)

Loss of consciousness

Seizures

ECG changes or documented arrhythmias

Previous cardiac disease (especially cardiac arrhythmias)

Burns

**Pass Mark is 13/20**

**SAQ 21: (14 marks)**

**1. What is your initial risk assessment? (3 marks)**

Max taken = 50 x 25 = 1250 mg, likely 1000 mg / 60 kg = 16-20 mg/kg of tricyclic antidepressant.

Potential for all major effects to occur within 2- 4 hours: tachycardia suggestive of anticholinergic effects. Seizure, coma, hypotension, cardiac dysrhythmias. Potentially fatal.

Requires close observation for at least 6 hours if does not develop toxicity, in acute area with cardiac monitoring.

**2. Name and justify one (1) key investigation and two (2) other investigations you would perform? (6 marks)**

Investigation	Justification
<u>Key investigation</u> ECG	Evaluate cardiotoxicity. Look for QRS widening (Na+ channel blockade) with prominent r wave in aVR. QRS >100 at risk of seizures; QRS >160 at risk of VT
<u>Other Investigations</u> Paracetamol level b-HCG VBG	Screening test in overdose Young woman – may complicate management, impact on disposition Development of any acidaemia

**3. 40 minutes after arriving in the emergency department, the patient has a generalised tonic-clonic seizure.**

**Her vital signs are now:**

**GCS 3**

**HR 120/min**

**BP 90/50**

**O2 sats 98% NRBM**

**List your 5 immediate management priorities, including endpoints of therapy. (5 marks)**

- Seizure management – Indication for Sodium bicarbonate 1-2mmol/kg IV. Midazolam 2.5-5mg IV if seizure ongoing. Endpoint = termination of seizure.
- Repeat ECG looking for signs of toxicity. If QRS prolongation and/or hypotension, indication for use of sodium bicarbonate 100 mmol 8.4%, with end point of QRS narrowing and haemodynamic stability.
- Early intubation to control airway and ventilation with predicted clinical course of coma and respiratory acidosis contributing to worsening sodium channel blockade. Appropriate use of RSI drugs.

- End point of: Hyperventilate TV 6-8mL/kg, PEEP 5, FiO<sub>2</sub> to maintain sats >95%, RR targeted to achieve pH 7.50-7.55
- Fluids: 20 mL/kg 0.9% saline/Hartmann's, repeat. Consider vasopressors if ongoing hypotension.
- Activated charcoal 50g, once airway secured given significant ingestion.
- Supportive – K<sup>+</sup> replacement with alkalinisation

**Pass mark: 9/14**

**SAQ 22: (15 Marks)**

Questions:

- 1. List up to 7 steps you would tell your registrar to do in preparation, to facilitate intubation when you arrive:**

**(7 marks)**

Don't do anything that will distress this patient any further. Ensure the registrar you are on your way, and give them a direct line to you.

Establish and secure IV Access

Prepare the difficult airway trolley, and have it ready at the bedside including VL and suction

Pre-oxygenate the patient with 100% O<sub>2</sub> and PEEP if tolerated via NIV.

Give fluid bolus of 500mls to aim reduction in HR to 100BPM and increase in BP to 100 systolic

Prepare the patient in a Ramped position aiming for ear to Sternoclavicular notch. Keep patient in a semi – upright position to facilitate ventilation

Prepare drugs for intubation. Ketamine 1mg/kg and Rocuronium 1mg/kg

Prepare and have ready Adrenaline Infusion to commence at 10mcg/min predicting hypotension at induction

Give broad spectrum Ab's to cover CAP.

Inform Intensive Care of your intentions, and the requirement for a bed.

- 2. You were successful in intubation. Despite 100% O<sub>2</sub>, you are still inadequately oxygenating the patient. The ETT has been confirmed in the correct place.**

**Please outline up to 4 possible causes for Hypoxia in this case and identify a treatment to deal with this:**

**(8 marks)**

<b>CAUSE</b>	<b>MANAGEMENT</b>
Ongoing V/Q Mismatch (Collapse, mucous plug)	Suction, Increase PEEP, Position,
Anaphylaxis	Adrenaline infusion
Hypovolaemia	Fluid Bolus
PTX	Decompression

**Pass mark: 9/15**

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## SAQ 23 (20 Marks)

### 1. List 8 potential causes for this abnormality

(8 Marks)

#### Causes for AF

1. Coronary artery disease
2. Hypertension
3. Rheumatic valvular heart disease
4. Thyrotoxicosis
5. COPDS
6. Pericarditis
7. Pulmonary emboli
8. Electrolyte abnormalities hypokalaemia / hypomagnesaemia
9. Pericarditis
10. Cardiomyopathies
11. Preexcitation syndromes

### 2. Your registrar asks you whether to aim for rhythm or rate control .

List 2 factors which would make you consider rhythm control in this lady and 2 factors which would make you consider rate control with a rationale for their inclusion

(4 Marks)

#### Rhythm control

Haemodynamic instability  
Symptomatic  
Reversible cause

#### Rate control

(No mortality difference)  
Asymptomatic or minimal symptoms  
Duration greater than 48 hours  
Non reversible cause

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**3. Your resident asks you whether she need to be anticoagulated.**

**List 8 factors you would consider for the above decision:**

**( 8 Marks)**

**Factors that increase risk of thromboembolism**

Age greater than 65 / 75

Female

Congestive heart failure

Previous stroke / TIA

Hypertension

Diabetes

**Risks of anticoagulation**

Falls

Previous bleeds GIT / ICH

Renal failure if using novel anticoagulants

**Pass mark: 12/20**

**SAQ 24: (16 Marks)**

**1. What features of her mental state exam indicate psychosis, list 4: (4 Marks)**

Positive symptoms – Hallucinations, delusions, disorganised speech, disorganised behaviour, catatonic

Negative symptoms – Blunted affect, emotional withdrawal, anhedonia, attention impairment.

Functional decline

Appearance

Lack of insight

**2. Missed medical diagnoses in psychiatric patients are reported in up to 45% of patients. What are the main pitfalls in the “medical clearance process” List For (4)**

**(4 Marks)**

History – difficult to get from patient, failure to seek collateral, limited by location of review.

Exam – Locations of patient, failure to do full examination, no vitals or MMSE, no Neuro exam.

Patient cooperation.

Acceptance of “medical clearance” or over reliance on investigations, failure of ongoing review.

**3. She has remained calm and responsive to your assessment and investigations. She is referred to the mental health team for review and they decide she is not a danger to herself, so can be followed up in the community. What features of her presentation would lead to you challenge that decision. List 3 (3 Marks)**

1<sup>st</sup> presentation

History of depression and self harm – high risk of harm

Carer fatigue

Weekend therefore delay to follow up

**4. She suddenly becomes more angry in the department while waiting for a mental health bed, her husband had left, she is pacing and threatening harm to herself. How do you manage this situation? List 5 steps (5 Marks)**

**(5 Marks)**

Patient – verbal and chemical de-escalation

Area – move to resus/monitored bed

Staff – security, nursing

Teams – mental health

Equipment – if sedated

Drugs – oral/iv

**Pass mark: 10/16**

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## SAQ 25: (13 marks)

Question:

**1. Describe the key findings on the X-ray. (3 marks)**

Dislocated L hip prosthesis

Prosthesis dislocated superiorly and possibly also posteriorly although difficult to determine on single view

No obvious peri-prosthetic fracture or other bony injury

**2. What is the most significant early complication of this injury, and how you would assess for it? (2 marks)**

Sciatic nerve compression – assess function of nerve – sensory distribution L5/S1 and motor function, esp peroneal N – foot drop

NB Ischaemic necrosis is not an early complication of prosthetic hip dislocations – this would be an incorrect answer

**3. There is no contraindication to procedural sedation for this patient, and you decide to perform the reduction in the ED.**

**Name 2 different methods of achieving reduction and briefly describe each technique.**

**(8 marks)**

(1 mark each for method of reduction, 3 marks each for accurate description)

Suggested answer

Any reasonable method – candidate does not need to know eponymous name but should be able to describe method including patient positioning and subsequent manoeuvres

Most common methods include

Allis manoeuvre

Patient supine, assistant stabilizing pelvis

Upward traction is exerted in line with the deformity and hip is flexed to 90 degrees

Hip can be gently rotated internally and externally until reduced

Whistler technique

Pt in supine position with both knees flexed to 130 degrees

Assistant stabilizes pelvis

Operator stands beside affected limb, places arm under affected knee to grab opposite knee

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With other hand, operator anchors ankle of affected leg  
Using arm as lever, clinician elevates affected knee

Captain Morgan maneuver

Patient supine, 90 degrees of hip and knee flexion

Operator steps one foot up onto gurney, placing knee under patients knee

Place one hand under the patients knee and the other over the patients ankle

Lift up on patient's femur, while gently pushing down on patients ankle

Lateral traction-countertraction method

Similar to Allis, except with the addition of lateral traction

Stimson method – prone or gravity method

Patient placed so distal pelvis overhangs the stretcher

Hip, knee and ankle are all flexed to 90 degrees

Downward pressure applied to prox posterior tibia

**Pass mark: 9/13**

**SAQ 26 (21 Marks)**

Questions:

- 1. List 8 differential diagnoses for post-partum fevers. (8 marks)**

**Factors that increase risk of thromboembolism**

Mastitis/Breast abscess  
Perineal wound infection  
C/section wound infection  
Endometritis/Retained placenta  
UTI/Pyelonephritis  
Pneumonia  
CNS infection – meningitis/encephalitis/spinal abscess  
Toxic shock syndrome (Group A Strep)  
Septic pelvic thrombosis (rare)  
DVT/PE

- 2. List 4 key details of the recent delivery that you would seek in this patient & state the significance. (8 marks)**

Key Details of Delivery	Significance
Mode of delivery (SCD vs C/section)	SVD increased risk of retained placenta
Use of epidural or spinal	Increased risk of CNS infection
Episiotomy or perineal tears	Increased chance of perineal wound infection
IDC insertion during labour	Increased risk of UTI
Prolonged rupture of membranes	Increased risk of endometritis
IV lines during labour	Increased risk of infection at site

- 3. Her vital signs further deteriorate whilst in the ED.**

**Temp 39C**  
**HR 130**  
**BP 75/45**  
**RR 20**  
**O2 sats 98% 2L/min NP**  
**GCS 15/15**

- List 5 key management priorities of this patient in the ED. (5 marks)**

**Factors that increase risk of thromboembolism**

Early broad spectrum antibiotic cover within 1 hour. (Piptaz & Clindamycin)  
Support circulation – N/saline 20mL/kg bolus and repeat if required to titrate to MAP > 60-65  
Early use of inotropes if fails to respond to fluid therapy – Noradrenaline infusion 0.1mcg/kg/min titrated to MAP > 60-65  
Seek & treat source of sepsis (eg USS for retained products, drainage of abscess)  
Referral for ongoing management in ICU

**Pass mark: 12/21**

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## SAQ 27 Long Questions (31 Marks)

Questions:

1. List five (5) potential differential diagnoses? (5 Marks)

Factors that increase risk of thromboembolism

Pulmonary Embolus
Ischaemia
Pericarditis
Pneumothorax
Pneumonia
Aortic dissection

2. During your assessment, she deteriorates clinically and becomes agitated, tachycardic, hypotensive and hypoxic.

Her vital signs are now:

GCS 13/15 (agitated),  
HR 130 Sinus Tachycardia  
BP 90/60  
Sats 89% RA  
RR 28.

For the table below, List five (5) immediate investigations and the rationale for each:

(10 Marks)

CXR	Alt DX- LRTI, PTx, cardiac size and shape
ECG	Ischaemia, arrhythmia
ABG	Gas exchange, metabolic status, Hb, creat for contrast Ix, bsl
Bedside ECHO	Fluid status, RWMA, Dx- PE/dissection
Lung USS	PTx

3. You diagnose a pericardial effusion from your history/examination and investigations.

List eight (8) common causes of ANY pericardial collection for patients presenting to the emergency department?

(8 Marks)

Factors that increase risk of thromboembolism

Infectious pathogen (viral, bacterial, HIV)
Neoplastic

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Renal failure
CCF
Aortic dissection
AMI +/- free wall rupture
Myxoedema
SLE
Rheumatoid arthritis

**4. List five (5) main ECHO features to support a clinical diagnosis of cardiac tamponade? (5 Marks)**

**Factors that increase risk of thromboembolism**

Pericardial effusion
Late diastolic collapse of RV free wall
Early diastolic collapse of RA free wall
Abnormal septal motion due to reciprocal ventricular filling
Dilated IVC with no respiratory collapse
Diastolic flow reversal in hepatic veins

**5. List three (3) ECG finding that support a clinical diagnosis of cardiac tamponade: (3 Marks)**

**Factors that increase risk of thromboembolism**

- Low voltage
- Tachycardia
- Electrical alternans

**Pass mark: 20/31**