

Candidate number \_\_\_\_\_

# **BOOK ONE ANSWERS**

## QUESTION 1 (20 marks) – DOUBLE QUESTION

A 54 year old woman presents to your tertiary ED with a 24 hour history of haemoptysis, getting worse in the last 4 hours. She has no known history of systemic illness and is on no medications. On arrival she is coughing up 5-10 ml of bright red blood every 10 mins.

- i. List the key components of your assessment (8 marks)

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Should include at least 2 components from each section below

- Primary survey
  - Manage in resus
  - Assessment of airway patency
  - Assessment of adequate oxygenation and ventilation (RR, Sats, VBG or ABG)
  - Assessment of haemodynamics, IV access etc
- History
  - History for underlying causes (lung disease, cardiac, FHx, autoimmune, infective, PE, smoking, recent procedures)
  - Medication history (anticoagulants), illicit drug use
  - Travel history, country of origin
- Exam
  - As above
  - Exclusion of other sources of bleeding eg pharynx
- Investigations:
  - Bloods: FBC, G and H, X-match if Hb low/anticipate large volume bleed, coags, EUC, LFTs
  - UA, ECG
  - ABG/VBG to assess gas exchange, lactate
  - CXR looking for bronchiectasis, infection, space-occupying lesions, vascular malformations, abscess, PE

- CT chest with contrast
- ECHO (mitral stenosis, shunting from AVM)

ii. List 5 causes of massive haemoptysis (5 marks)

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- Bronchiectasis
- Tuberculosis
- Cancer: bronchogenic lung , metastases to lung
- Immune lung disease (Goodpasture's, Wegener's granulomatosis)
- Vascular malformations eg AVM
- Thoracic aortic aneurysm
- Lung abscess
- Necrotising lung infections eg S.aureus
- Iatrogenic (post-procedure)
- PE esp septic emboli
- Coagulopathy
- Cardiac eg mitral stenosis

While in the resus room, she suddenly starts to cough up larger volumes of blood, now around 50 ml every 5 minutes.

iii. List 7 key interventions to perform since this increase in haemoptysis (7 marks)

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- Re-assess ABCs
- Fluid resuscitation
- Consider transfusion of PRBC/activation massive transfusion protocol as required
- Airway clearance
- Oxygen to maintain adequate oxygenation
- Airway management: intubation if haemoptysis continuing/prior to bronchoscopy (potentially difficult), poor gas exchange, losing airway patency
- If side of bleeding identified consider selective intubation of unaffected side and/or nurse with bleeding lung dependent
- Tranexamic acid nebulised neat: 500mg to 1g, can be repeated
- Reversal of anticoagulation if not done before
- Urgent bronchoscopy
- Possible interventional radiology procedure if in IR-capable centre for angiography and embolization of bleeding point
- Keep NBM
- Antibiotics to cover likely cause (Pseudomonas unless other likely organism):  
Ciprofloxacin 750mg q12h po or piperacillin/tazobactam 4.5g q6h iv

QUESTION 2 (13 marks)

A 38 year old male patient presents to your urban ED with sudden onset occipital headache and vomiting whilst lifting weights at the gym.

Vital signs      GCS 14  
                         P 100 bpm  
                         BP 180/70 mmHg  
                         Temp 36 deg C

i. Interpret the CT images (4 marks)

**CT IMAGES ARE SHOWN IN THE PROPS BOOKLET, PAGE 3**

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- Extensive SAH in the suprasellar cistern (-> prepontine cistern) -> foramen magnum & brainstem
- Left greater than right supraseller cistern
- Consistent with circle of Willis aneurysm rupture
- Early temporal horn dilatation indicative early hydrocephalus
- Risk / early obstructive hydrocephalus (given temporal horn dilatation or presence of blood around brainstem / FM)

ii. Outline 5 management priorities (5 marks)

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- Place in resus/monitoring and 15 min neuro obs
- Analgesia, antiemetic - appropriate
- NBM

- Aggressive BP control – aim < 140 systolic, appropriate agent – hydralazine example
- Head up 30 degree
- Euglycaemia, euthermia
- Discussion with neuro surgical centre
- Liaise with retrieval
- Prepare for intubation

iii. List 4 strategies to minimize abnormalities in intracranial pressure if this patient was intubated (4 marks)

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- Head up 30 degrees
- Avoid ETT tube tie - tape instead
- Fentanyl premed prior to intubation
- Normal oxygenation / sodium
- Avoid hypo/hyperventilation
- Mannitol / hypertonic saline
- Thiopentone coma
- Ca channel blockers to avoid vasospasm

QUESTION 3 (16 marks)

A 54 year old lady presents with alcohol intoxication. 2 hours after arrival you are asked to review her as she is increasingly drowsy.

Vital signs      HR 75 bpm  
                      BP 102/64 mmHg  
                      SaO2 93% RA  
                      GCS 9  
                      Temp 36.5 deg C

i. List 5 differentials for her condition (5 marks)

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- Tox
  - Antidepressants - TCA (tachy more likely)
  - Sedative - benzos, opiates
  - Cardiac - clonidine, beta blocker, antiarrhythmics
  - Alcohol
  - Recreational - heroin, GHB
- Head injury
- Sepsis
- Metabolic - hypoglycaemia, Addisonian

ii. List 3 relevant findings on the ECG (3 marks)

**A 12 LEAD ECG IS SHOWN IN THE PROPS BOOKLET, PAGE 4**

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- B Blocker effects:
  - Prolonged PR, note not yet bradycardic
- Sodium channel blocker:
  - Broad QRS (>100ms)
  - Right axis deviation of the terminal QRS in aVR

iii. List 4 immediate life threats following a propranolol overdose and a specific treatment for each (8 marks)

Life threat	Specific treatment

- |                           |  |
|---------------------------|--|
| • Coma                    | Airway protection                            |
| • Seizures                | Benzodiazepines                              |
| • Bradycardia/hypotension | Atropine, adrenaline, isoprenaline, HIET etc |
| • Na channel blockade     | Na bicarb appropriate dose                   |

## QUESTION 4 (13 marks)

You are asked to review a 3 month old male who was brought in by ambulance with his mother following an unresponsive episode at home. The infant became floppy and did not appear to breathe for almost 20 seconds.

- i. List 4 pertinent features in the history (4 marks)

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- Resuscitation required (e.g., stimulation, mouth-to-mouth, chest compressions)
- Temporal relationship with feeding, sleep, crying, vomiting, choking, gagging
- Colour (cyanosis, pallor)
- Change in tone (including seizure activity)
- Respiratory symptoms or other intercurrent illness
- Prematurity (before 37 wk)
- History of trauma
- History of prior apnea
- Prior airway or respiratory difficulties (snoring, stridor)
- Known reflux
- Prior feeding difficulties (choking, gagging, coughing with feeds)
- Immunization status (pertussis)
- Family History – SIDS, cardiac dysrhythmias/congenital heart disease
- Medication use, or used by breastfeeding parent

- ii. What is the likely diagnosis (1 mark)

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- Brief resolved unexplained event - BRUE (NOT ALTE – guidelines have changed) although both acceptable

iii. List 4 low risk features that need to be satisfied for this diagnosis (4 marks)

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- Age > 60 days
- Gestational age >32 weeks and post-conception age >45 weeks
- First event
- Duration < 1 minute
- No CPR by trained medical provider performed
- No concerning historical features
- No concerning physical examination findings

iv. List 4 indications for admission (4 marks)

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- Post-conception age <48 weeks
- Ill appearing or concerning findings on examination
- Bronchiolitis or Pertussis with apnoea
- Suspicion of non-accidental trauma
- Past medical history that places them at risk for poor outcomes
- Prolonged central apnoea or more than 1 episode in 24 hours
- Family history of SIDS or multiple BRUEs
- Poor follow-up
- Parental concern/anxiety

QUESTION 5 (19 marks)

A 47 year old male presents with epigastric pain for the past 45 minutes.

i. Describe and interpret the ECG (4 marks)

**A 12 LEAD ECG IS SHOWN IN THE PROPS BOOKLET, PAGE 5**

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- STE > 2mm in the inferior leads
- STE III>II
- ST depression V2, I, AVL
- Pathological q wave III
- Inferior STEMI with RV infarct
- RV infarction is associated with 40% of inferior STEMI's

ii. Describe and justify your immediate pharmacological treatment (4 marks)

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- Aspirin 300mg PO
- Analgesia – any sensible dose of morphine or fentanyl
- Other anti-platelet and anti-coagulant medications – any of clopidogrel, ticagrelor, heparin, enoxaparin in appropriate doses/regimens
- It is recommended that supplementary oxygen is only administered if there is evidence of hypoxia (Sats < 90% measured by pulse oximeter), aiming for oxygen saturations of 94-98% (Nikolaou 2015). Hyperoxia was associated with increase in infarct size. Physiological data suggests that hyperoxia leads to oxygen free radical generation and a reduction in coronary flow, and increased coronary vascular resistance, ultimately adding insult to the already infarcted myocardium (Farquhar 2009).

- RV infarcts are pre-load dependent, and administration of nitrates causes systemic venodilation and therefore a reduction in venous return. The subsequent reduction in preload, reduces cardiac output and BP, this could ultimately worsen the ischaemia.

iii. His pain settles with aliquots of fentanyl but the ECG changes persist. You are 90 minutes away from a PCI centre. Describe and justify your reperfusion plan (3 marks)

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- Thrombolyse
- He needs thrombolysis. He presented within an hour of his symptoms, and therefore should undergo PCI within 60mins. As this is not achievable; recommendations advise he should receive thrombolysis, as long as there are no contraindications.

iv. List 5 absolute contraindications to fibrinolysis (5 marks)

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### 2013 ACCF/AHA Guideline for the Management of ST-Elevation Myocardial Infarction

#### Absolute contraindications

- Any prior ICH
- Known structural cerebral vascular lesion (eg, arteriovenous malformation)
- Known malignant intracranial neoplasm (primary or metastatic)
- Ischemic stroke within 3 mo
- Suspected aortic dissection
- Active bleeding or bleeding diathesis (excluding menses)
- Significant closed-head or facial trauma within 3 mo
- Intracranial or intraspinal surgery within 2 mo
- For streptokinase, prior treatment within the previous 6 mo

#### Relative contraindications

- History of chronic, severe, poorly controlled hypertension
- Significant hypertension on presentation (SBP >180 mm Hg or DBP >110 mm Hg)

- History of prior ischemic stroke >3 mo
- Dementia
- Known intracranial pathology not covered in absolute contraindications
- Traumatic or prolonged (>10 min) CPR
- Major surgery (<3 wk)
- Recent (within 2 to 4 wk) internal bleeding
- Noncompressible vascular punctures
- Pregnancy
- Active peptic ulcer
- Oral anticoagulant therapy

v. What constitutes failure of fibrinolysis, suggesting need for a rescue PCI (3 marks)

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- Failure of ST elevation to reduce by (50% - 75%) at 90 minutes post lysis
- Persistent pain
- The absence of chest pain following thrombolytic therapy does not imply reperfusion; however persistent ischaemic chest pain indicates failure (de Belder 2001). Cardiogenic shock may occur because of the already infarcted myocardium.

QUESTION 6 (15 marks)

A 30 year old man presents following a MBA. As he swerved to avoid a car, his right foot impacted the ground with his knee fully extended. His only complaint is of severe right knee pain and swelling.

i. List 5 relevant findings on the Xray (5 marks)

**XRAYS ARE SHOWN IN THE PROPS BOOKLET, PAGES 6&7**

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- Comminuted fracture medial tibial plateau, depressed - Schatzker IV grade
- Intercondylar extension
- Posterior displacement of medial tibial plateau
- Subluxation of knee joint with antero-lateral translocation of tibia relative to femur
- Lipohaemarthrosis

ii. List 3 priorities in management (3 marks)

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- Knee joint relocation – ideally orthopaedic involvement if no time delay – and splinting
- Analgesia
- CT angiography of popliteal artery – allow mark only if knee relocation mentioned first

iii. List 4 anatomical structures that are likely to be injured which are not seen on plain Xray (4 marks)

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- Popliteal artery
- Peroneal nerve
- MCL / LCL
- ACL / PCL
- Meniscal injury

iv. List 3 specific complications you would look for (3 marks)

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- Neuro
  - Peroneal nerve injury
  - Loss of foot dorsiflexion
  - Paraesthesia anterolateral shin, dorsum of foot
- Vascular
  - Ischaemic lower limb
  - Decreased pulses DP / PT – palpable and / or doppler
  - Compartment syndrome

QUESTION 7 (14 marks)

i. List the clinical features of an isolated 7<sup>th</sup> nerve palsy due to a peripheral lesion (3 marks)

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- Weakness of facial musculature upper and lower
- May have decreased taste ipsilateral affecting anterior 2/3 tongue
- Ipsilateral hyperacusis
- Ipsilateral reduced tear production

ii. List 5 potential causes of an isolated 7<sup>th</sup> nerve palsy due to a peripheral lesion (5 marks)

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- Cerebropontine angle mass eg acoustic neuroma, facial neuroma, meningioma, cholesteatoma, metastasis
- Temporal bone fracture
- Parotid disorder or neoplasm
- Facial laceration
- Mastoid surgery
- Acute or chronic suppurative otitis media
- Malignant otitis externa
- Guillain Barre syndrome
- Lyme disease
- Sarcoidosis
- Bell's palsy
- Ramsay Hunt syndrome
- Nasopharyngeal malignancy
- Collagen vascular disease
- Diabetes
- Botulism

- HIV
- Syphilis
- Acute porphyrias
- EBV

iii. What treatment should be advised in idiopathic Bell's palsy (2 marks)

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- Eye care to prevent corneal exposure; artificial tear 1-2 hourly with lubricating ointment at night
- Steroid therapy; high dose 60mg daily for 5 days then taper
- Antivirals – controversial, but acceptable

iv. What is the prognosis for recovery from idiopathic Bell's Palsy (2 marks)

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- 86% complete recovery at 2 months; incomplete paralysis favours a better outcome

v. What factors are associated with a poorer outcome (2 marks)

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- Pregnancy
- Diabetes
- Associated taste disorder
- Older age

QUESTION 8 (10 marks)

A 3 year old girl is en route by ambulance after drowning in a family pool.

i. List 5 factors which indicate a poor prognosis for this patient (5 marks)

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- No CPR > 10 minutes
- Submersion > 5 minutes
- Time to first breath > 30 minutes
- Coma/ cardiac arrest at scene
- GCS 3
- pH < 7.1
- Coma on arrival
- Other co morbidities – injury, type of water (fresh vs salt), NAI

Prognostic scores

Orlowski scale

< 3 factors = 90% chance good recovery

> 3 factors = 5% recovery

Age < 3 years

Submersion > 5 minutes

No CPR > 10min

Coma on arrival

pH < 7.1

Conn and Modell – 2 hour post immersion conscious level – if alert GCS > 15, then good outcome with no neurological deficit = 100%, if category 3 (flaccid, GCS 3) < 20% good outcome

ii. Outline your preparation for the patient's arrival (5 marks)

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- Department: adequate staffing / patient flow of rest of department, handover as required
- Resuscitation bay: paediatric trolley and equipment available including IO needle and ETT, heaters
- Staff: resuscitation team with clear delineation of roles (team leader, airway/drugs)
- Notify paediatric and anaesthetic team / social work for family / staff for CPR available
- Weight estimation – age x 2 +8=14kg
- Drug estimation – adrenaline 0.1mL/kg of 1:10000=1.4ml
  - Fluid 20ml/kg bolus = 280ml
  - Glucose 10% dextrose 2ml/kg 28ml
  - 4j/kg shock -56j
  - Atropine 0.02mg/kg

QUESTION 9 (12 marks)

A 32 year old female G1P0 at 30 weeks gestation presents to ED with constant epigastric pain and headache.

Vital signs      GCS 14  
                      P 100 bpm  
                      BP 170/100 mmHg  
                      Temp 36.8 deg C

i. List your differential diagnosis (4 marks)

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- Pre-eclampsia
- Pancreatitis
- Acute cholecystitis
- Gastritis
- Others

ii. She then has a generalised seizure. List your treatment priorities (5 marks)

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- Urgent O&G attendance
- Ensure airway patency/O<sub>2</sub>
- Left lateral/wedge
- IV access
- Seizure control – Midazolam 2.5 mg IV stat, repeat in 5 minutes if required and MgSO<sub>4</sub>: 4g IV over 10 minutes then 1g/hr infusion
- Seek and treat hypoglycaemia

- BP control: Hydralazine 5-10mg IV over 10 minutes – repeat in 20min or Labetalol 10-20mg IV over 5 minutes q 5min
- Steroids: Betamethasone (2 doses) 12mg IM, 24 hours apart

iii. Name the labelled parts of the CTG (3 marks)

**A CTG IS SHOWN IN THE PROPS BOOKLET, PAGE 8**

A

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B

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C

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- A Baseline heart rate – 138
- B Late deceleration
- C Uterine contraction