

Candidate number _____

BOOK THREE

QUESTION 19 (23 marks) - DOUBLE QUESTION

A 59 year old man presents with signs suggestive of a left anterior circulation stroke.

- i. Several pathological processes can mimic stroke. Complete the following table listing 5 “stroke mimics” and indicating features of assessment that would help to clarify if the patient has a stroke or a “mimic” (10 marks)

Condition (“mimic”)	Features that suggest mimic versus stroke
Hypoglycaemia	Low sugar on glucometer, known diabetes/insulin use
Mass lesions – tumours, cerebral abscess	CT brain, history of cancer/fever
Seizure/post-ictal/Todd’s	Known epilepsy, witnessed movements, tongue bite, incontinence
Hemiplegic migraine	Known migraine, presence of headache
Functional/factitious/conversion	Situational (crisis etc)
Encephalopathies/metabolic	Blood tests, PHx
MS	Known history
Bell’s palsy	LMN face palsy (forehead NOT spared)
Syncope	Cardiac disease, ECG/monitor

- ii. It appears that this patient has a stroke although the non-contrast brain CT is normal. What are the standard inclusion criteria used for stroke fibrinolysis (4 marks)

Clinical ischaemic stroke with

- Age > 18 years
- Clear onset within 3 hours (or out to 4.5 hours accepted – 9 hours only with advanced imaging/clot retrieval)
- Impairment/deficit measurable on NIHHS
- Baseline CT with no evidence of ICH
- Consent (or documentation of discussion)

- iii. List six exclusion criteria for thrombolysis in stroke (6 marks)

- Intra-cranial haemorrhage
- Surgery < 14 days
- GI/GU bleed < 21 days
- Non-compressible arterial puncture or LP < 7 days
- SBP > 185
- On NOAC or warfarin (INR > 1.5) or heparin/LMWH
- Platelets < 100
- Glucose < 2.8 or > 22

- iv. The patient's wife, a Registered Nurse, wants to know about the risks & benefits of lysis for her husband's stroke. She has heard of the NINDS trial and the "three hour window". Complete the table below (3 marks)

Likelihood of improvement in functional outcome with lysis	tPA group 30% (OR 1.58) more likely to have minimal or no disability (mRS ≤ 1)
Risk of symptomatic ICH	6.4% (versus 0.6% in control group)
Overall mortality at 3 months	No difference

QUESTION 20 (13 marks)

An 86 year old male presents to ED with severe abdominal pain. His medical history includes AF and IHD. He is taking aspirin and atorvastatin.

Vital signs are:

P 130

BP 160/90

RR 20

SaO₂ 97% RA

His abdomen is diffusely tender with guarding. Bedside USS of his abdomen is performed.

A SINGLE ULTRASOUND IMAGE IS SHOWN IN THE PROPS BOOKLET, PAGE 9

i. Describe 3 positive findings in the USS image (3 marks)

- AAA
- Significant intraluminal clot
- Suggestion of rupture

ii. Outline 4 immediate management steps that are required for this patient (4 marks)

- Analgesia – morphine/fentanyl
- Large bore IVC x2
- Cross match 8 units PRC, activate massive transfusion protocol
- Urgent Vascular Surgery consult
- Urgent OT/endoluminal (could consider CT for pre op planning (given BP stable) in discussion with vascular team. However, there should be plan to go straight to OT afterwards)

The patient's blood pressure falls to 70 SBP while awaiting vascular surgeon arrival and he is now receiving a blood transfusion.

iii. Define massive transfusion in an adult patient (2 marks)

- Replacement of >1 blood volume in 24 hours or >50% of blood volume in 4 hours (adult blood volume is approximately 70 mL/kg)

iv. List 4 target parameters when giving massive transfusion (4 marks)

4 of parameters listed below – note Hb is incorrect – see note

- Temperature >35 °C
- Acid-base status pH >7.2, base excess <-6, lactate <4 mmol/L
- Ionised calcium (Ca) >1.1 mmol/L
- Haemoglobin (Hb) This should not be used alone as transfusion trigger; and, should be interpreted in context with haemodynamic status, organ & tissue perfusion
- Platelet (Plt) >50 x 10⁹ /L
- PT/APTT <1.5x of normal
- INR ≤ 1.5
- Fibrinogen >1.0 g/L

Ref: Australian Red Cross Blood service

QUESTION 21 (19 marks)

- i. List 5 different methods of spinal immobilisation for a suspected C-spine injury with neck pain but no abnormal neurology, and no other injuries (5 marks)
- Rigid Collar - Hard collar / Philadelphia / Miami J
 - Soft collar
 - Foam head blocks or sandbags to sides of head
 - Head tape
 - Laying patient flat on bed, head mid-line
 - Vacuum mattress
 - Manual in line stabilisation
- ii. List 5 complications of cervical spine immobilisation (5 marks)
- Raised ICP
 - Reduced access to the neck
 - Pain and discomfort - pressure areas
 - Airway compromise added difficulty with airway interventions
 - Aspiration risk
 - Impaired ventilation
 - Impaired head movement
 - Potential worsening of spinal cord injury
 - Unnecessary distraction from important resuscitation issues
 - Unnecessary additional radiology esp in children
 - Requirement for log-rolling, increased nursing requirements, staff distraction from other duties
- iii. Clinical decision rules are frequently derived using logistic regression analysis. Define/describe logistic regression (2 marks)
- Logistic regression is a statistical method for analysing a dataset in which there are one or more independent variables that determine an outcome. The outcome is measured with a dichotomous variable (in which there are only two possible outcomes).
 - In logistic regression, the dependent variable is binary or dichotomous, i.e. it only contains data coded as 1 (TRUE, success, pregnant, etc.) or 0 (FALSE, failure, non-pregnant, etc.).
 - The goal of logistic regression is to find the best fitting (yet biologically reasonable) model to describe the relationship between the dichotomous characteristic of interest (dependent variable = response or outcome variable) and a set of independent (predictor or explanatory) variables.

iv. List 4 exclusion criteria that were used in the derivation of the Canadian C-spine rules and preclude its use in practice (4 marks)

- Age <16 years old
- Non-trauma cases, Minor injuries (ie simple laceration) and did not meet inclusion criteria
- GCS<15
- Grossly abnormal VS
- Injured >48hrs previously
- Penetrating trauma
- Acute paralysis
- Known vertebral disease (ie RA, spine stenosis, previous C-spine injury, ankylosing spondylitis)
- Returned for reassessment of same injury
- Pregnant

v. According to the Canadian C-spine rules, which stable adult patients are mandated to have C-spine radiography (3 marks)

- Age >65
- Dangerous mechanism
- Paraesthesias in extremities

QUESTION 22 (14 marks)

A 24 year-old multiparous woman who is 36 weeks pregnant presents to triage in labour. She is transferred to the resuscitation room and the nurse tells you the head is on show. The maternity ward is located in a separate building to the ED.

i. Outline 4 of your immediate actions (4 marks)

- Prepare for delivery in ED
- Prepare neonatal resuscitaire
- Prepare team and allocate roles (delivery, baby, mother)
- Call for help (midwife, O&G, paed, SW)
- Prepare and check neonatal equipment (suction, BVM)
- Prepare drugs, IVC (syntocinon)

The baby is delivered within minutes. The cord is clamped and cut.

ii. Outline 3 features of your routine initial management of the newborn infant (3 marks)

- Temperature control (warm, rub, dry)
- Airway (anticipate cry, stimulate if required)
- Breathing/Circulation
- APGAR

The cord has been clamped and cut and the placenta is still in-situ. The midwife is yet to arrive.

iii. Describe 3 principles of management of the third stage of this labour (3 marks)

- Check no twin
- Administer syntocinon 10 units IV
- Deliver placenta (controlled cord traction, inspect for completeness)
- Uterine massage
- Observe for PV loss
- Examine perineum for tears

The placenta is delivered. It appears incomplete and the patient has very heavy PV bleeding.

iv. List 4 of your immediate actions (4 marks)

- Ensure O&G assistance/presence
- Uterine massage
- Resuscitate (IV access, transfusion – possible MTP)
- IDC and empty bladder
- Visual inspection (check for trauma/uterine inversion)
- Further oxytocic (syntocinon, ergometrine)
- Bimanual uterine compression

QUESTION 23 (21 marks)

A 60 year old paraplegic man is complaining of chills and rigors. He is a Type 2 diabetic on metformin.

Vital signs

T 39 deg C

P 90

BP 110/70

RR 18

SaO₂ 99% RA

A CLINICAL IMAGE IS SHOWN IN THE PROPS BOOKLET, PAGE 10

- i. Describe the image and list your provisional diagnosis (2 marks)
 - Sensible description
 - Fourniers gangrene/necrotising fasciitis of the perineal region/genitalia

- ii. List 4 predisposing factors for this condition (4 marks)
 - DM
 - Morbid obesity
 - Alcoholism
 - Cirrhosis
 - Malignancy
 - Immunosuppression – steroids, HIV etc

- iii. List 5 important investigations you will order and outline your reasoning (10 marks)
 - FBP
 - VBG/lactate
 - Blood cultures
 - Coag/DIC screen
 - Imaging – XR/CT/US
 - Above with sensible reasoning

- iv. Repeat vital signs are pulse 110, BP 85/60, and RR 24.
Outline your early management steps. Provide doses and end points where appropriate (5 marks)
- Haemodynamic resuscitation, with suitable end points
 - Appropriate crystalloid
 - Move to vasopressors eg norad as necessary, with appropriate dosing
 - IV Antibiotics (empirical)
 - Meropenem 1g tds
 - Vancomycin 20-30mg/kg loading
 - Clindamycin 600mg tds
 - Early surgical review and debridement
 - Continuous haemodynamic monitoring, fluid status/IDC

QUESTION 24 (17 marks)

A 24 year old man presents with a wound to his proximal right index finger after an accident on a construction site. You decide that the wound requires suturing.

i. Describe the technique of a median nerve block (4 marks)

- Consent, position patient
- Universal precautions, clean skin, aseptic technique
- Identify site of injection: proximal wrist crease, between FCR and PL tendons
- Inject 3-5ml at 10-15mm using 25G needle (or ultrasound guided)
- Infiltrate superficially, proximal to flexor retinaculum for palmar cutaneous branch
- Check block and record procedure in notes

ii. What would be the maximum volume of 1% lignocaine for this man, assuming a weight of 85kg? Show your calculations (2 marks)

- 1% lignocaine = 10 mg/ml
- Maximum dose = 3mg/kg x 85kg = 255mg
- Volume = 25.5ml

- $\text{mg} = 10 \times \% \times \text{mL}$
- $255 = 10 \times 1 \times \text{mL}$
- $\text{mL} = 255/10 = 25.5$
- (1 mark for calculation, 1 mark for volume)

iii. List 6 clinical features of local anaesthetic toxicity (6 marks)

CNS

- numbness of tongue and circumoral tissue
- restlessness
- tinnitus, vertigo
- shivering
- muscular twitching & tremors (initially involving muscles of face & distal parts of extremities)
- generalised convulsions
- generalised depression
- decreased LOC, apnoea

CVS

- hypertension & tachycardia
- peripheral vasodilatation, profound hypotension -> decreased Q
- sinus bradycardia, intracardiac conduction defects (prolonged PR & QRS complex), ventricular arrhythmias, cardiac arrest.

- iv. List the key steps in the management of severe local anaesthetic toxicity (5 marks)

Principles

- Limit LA exposure
- Prolonged normal resuscitation
- Consider lipid emulsion administration
- Prevention of acidosis

- Mild symptoms – midazolam boluses IV (raises seizure threshold)
- Stop injecting or infusion!
- Call for help
 - A – ETT
 - B – FiO₂ 1.0, hyperventilate (avoid acidosis -> HCO₃⁻ 1mmol/kg)
 - C – defibrillation, CPR, fluid, inotropes, amiodarone 5mg/kg,
 - D – midazolam, propofol, thiopentone
 - Lipid emulsion (20% intralipid)
 - 1 mL/kg (over 1min) q3min x 3 then
 - Infusion 0.25mL/kg/min

QUESTION 25 (13 marks)

A 16 year old girl presents to ED after syncope during a running event at the school sports carnival. Her vital signs are GCS 15, P 70, BP 118/70, RR 18 and afebrile.

i. List 6 relevant historical features (6 marks)

- Palpitations
- Prior exertional syncope (LVOT obstruction or ventricular arrhythmia)
- Exertional dyspnoea / orthopnea / PND (LV dysfunction)
- Chest pain (thick LV wall or aberrant coronaries)
- Recent viral infection
- Congenital heart disease (AS)
- Family history of sudden cardiac death or cardiomyopathy

ii. List 3 relevant findings on the ECG, and your provisional diagnosis (4 marks)

AN ECG IS SHOWN IN THE PROPS BOOKLET, PAGE 11

- SR
- Deep narrow septal/lateral Q-waves
- LVH
- Inferior TWI
- Consistent with HCM

iii. List your subsequent steps in management (3 marks)

- Echo
- Cardiology review (inpatient or outpatient acceptable depending on social circumstances)
- Consider need for ICD
- Family genetic screening

QUESTION 26 (21 marks)

You are a doctor at a well-equipped mobile clinic providing health services to a 5-day ultra-endurance competition in the West MacDonal Ranges near Alice Springs. On the third day of competition a 30 year old female competitor is brought to your clinic having collapsed. She is confused, agitated and complaining of a headache.

- i. What are the key components of your initial assessment? List 3 features in each category (6 marks)

History	<p>Normal health – allergies, meds, PHx etc</p> <p>Events - from pt or witness – circumstances of collapse, preceding problems (chest pain, palp'n etc)</p> <p>Current symptoms – detail of headache (onset etc), n/v, symptoms of injury from fall</p>
Examination	<p>Vitals – especially core temp</p> <p>Neuro exam – deficit suggestive of IC event, signs RICP</p> <p>CV – dysrhythmia? Evidence structural heart disease?</p> <p>Other – evidence of injury from collapse/fall e.g. head injury</p>

- ii. List 4 differential diagnoses for this presentation (4 marks)

- Heat stroke
- Cerebral event – ICH etc
- Electrolyte/endocrine abnormality – hypo/hypernatraemia, hypoglycaemia
- Snake bite
- Mechanical fall with injury

- iii. The patient's GCS deteriorates and she has a prolonged generalised seizure. An iStat venous blood test is performed. The results are displayed. List two drugs you would use to urgently treat this problem now (6 marks)

pH 7.25
 pCO₂ 42
 pO₂ 25.2
 HCO₃ 18
 Hb 147 (120-160)
 K⁺ 5.2 (3.2-5.2)
 Na⁺ 114 (135-145)
 Glu 6.9 (3.9-5.8)
 Lac 6.2 (0.5-2.0)
 Cr 115 (45-90)

Drug	Dose	Route
Midazolam	Titrated doses, 5mg & reassess	IV (or IMI, IO)
3% hypertonic saline	2-3ml/kg over 10 min	IV infusion

- iv. The patient has a rectal temperature of 42⁰C. List 5 complications of exertional heat stroke (5 marks)

- Confusion, seizures, cerebral oedema
- CV collapse, shock, pulm oedema
- ARDS
- AKI – especially from rhabdo
- Hepatic injury – from transaminitis to frank necrosis
- DIC
- Rhabdo
- Electrolyte derangement

QUESTION 27 (22 marks)

You receive a batphone regarding a usually well 83 year old man who was well this morning. His wife prepared him a drink, he went upstairs to drink it and a few minutes later his wife rushed upstairs to find him unconscious on the ground, possibly not moving his left side.

On arrival in ED he has the following vital signs:
HR 145, RR 40, BP 124/75, SaO₂ 98% on 15L NRBM, GCS 9 (E2V2M5), mottled peripheries

- i. List 5 potential causes for this presentation (5 marks)
- Neurological
 - Seizure
 - Intracranial haemorrhage spontaneous/traumatic
 - Bleed into SOL
 - Brainstem stroke
 - Trauma
 - Fall with traumatic brain injury
 - Toxicological (should at least have 1 toxicological cause named)
 - Cyanide
 - Opioid
 - Benzodiazepine
 - Hypoxic brain injury
 - Choking episode
 - Aspiration pneumonitis
 - Sepsis/Delirium
 - Meningitis/encephalitis
 - Metabolic
 - Hypoglycaemia
 - Hyponatraemia

You perform a CT head with contrast which is completely normal. His clinical status remains unchanged and the following VBG is obtained:

	Result
pH	7.15
CO ₂	26
Na	135
K	3.7
Cl	105
Gluc	8
Lactate	19
HC0 ₃	9
Creat	80

ii. Interpret the blood gas and list 4 possible toxicological causes for the findings (6 marks)

- Acidaemia, high AG metabolic acidosis, partially compensated, lactataemia
- Toxicological causes
 - Cyanide
 - Isoniazid, Iron
 - Alcohol (ethylene glycol, methanol, propylene glycol)
 - Salicylates
 - Valproate
 - Paraldehyde

His wife shows you the packet bought from the health food store from which she had prepared his drink. You realise that the likely cause of his presentation is likely to be cyanide toxicity.

iii. List 5 signs or symptoms of moderate or severe cyanide toxicity (5 marks)

Mild Cyanide Toxicity

Nausea
Dizziness
Drowsiness
Tachypnea

Moderate Cyanide Toxicity

Loss of consciousness for a short period
Vomiting
Seizure
Cyanosis
Metabolic/lactic acidosis
Increased anion gap
Tachycardia, hypotension

Severe Cyanide Toxicity

Deep coma
Dilated non-reactive pupils
Deteriorating cardio-respiratory function
Cardio-respiratory arrest

iv. Name 2 of the possible antidotes used in the treatment of cyanide toxicity and for each antidote list 2 potential problems with its use (6 marks)

Antidote	Potential problems
Hydroxocobalamin	Generally safe. Dose needed is supplied via cyanokit which contains 2 x 2.5g vials, expensive SEs: Red discolouration of urine/skin, nausea. Minor hypertension, bradycardia and tachycardia
Sodium thiosulphate	Usually used in moderate toxicity SEs usually minor: nausea, vomiting, hypotension, headache, abdominal pain
Dicobalt Edetate	Adverse reactions can occur usually if given in absence of cyanide poisoning. SEs include: seizure, oedema of face, neck, larynx, chest pain, dyspnoea, hypotension, vomiting, urticaria