

Northern Sydney Hospitals/NSW HETI Network 2

FELLOWSHIP EXAMINATION PRACTICE PAPER

2016.2

Short Answer Questions

Candidate directions:

1. This is a 3 hour examination
2. There are 3 separate books of 9 questions each. Each book should be completed in 1 hour.
3. Props (images, ECGs) are reproduced in the accompanying props book
4. The first question in each book is a double question. Otherwise questions are of similar value
5. Answer each question in the space provided on the examination paper.
6. Write your name on each page

Candidate number _____

BOOK ONE

QUESTION 1 (26 marks) – DOUBLE QUESTION

A 42 year old female who is 32 weeks gestation presents to your urban district ED. She has noticed increasing ankle oedema recently. Today, she has complained of blurred vision and a mild headache. She also has some non-specific upper abdominal pain but no PV bleeding or show of fluid. Her vital signs are: RR 18, HR 120, BP 170/115, SaO2 99% R/A. She is conscious and alert.

- i. List 4 differential diagnoses (4 marks)
 - Severe pre-eclampsia
 - HELLP
 - Premature labour
 - Placental abruption (concealed)
 - Biliary colic
 - Cholecystitis
 - Gastritis
 - Pancreatitis

- ii. List 4 potential complications of this condition (4 marks)
 - Seizures (eclampsia)
 - Pulmonary oedema
 - HELLP
 - AKI
 - DIC
 - Maternal death
 - Foetal death

- iii. List 5 of the most important investigations you would perform in the ED and provide your reasoning (10 marks)
 - Urine dipstick - proteinuria
 - FBC - thrombocytopenia , anaemia (haemolysis) (HELLP)
 - LDH - haemolysis (HELLP)
 - LFTs - transaminitis (HELLP)
 - Uric acid - suggestive of pre-eclampsia
 - Creatinine - AKI
 - DIC screen/D dimer/fibrinogen - ?DIC
 - Lipase - to exclude pancreatitis

- iv. The patient has a generalised seizure lasting 5 minutes that self resolves. The patient is moved to resus, has appropriate IV access, IV fluids and oxygen running. What are your 4 next most important actions (8 marks)
- Positioning – wedge under right hip
 - IV Magnesium - load 4g (16mmol) over 5 - 10 mins then infusion 1g (4mmol)/hour (must give reasonable loading dose then an infusion). Aim Mg level 2.0 - 4.0
 - BP control - must give a reasonable drug/dose eg IV Hydralazine 5 – 10mg prn q 15-20 min aim DBP around 90 (or Labetolol or SNIP)
 - Plan for urgent delivery – urgent O+G consult/paediatric s/anaesthetics prepare for delivery etc
 - Foetal steroids (eg Betamethasone IM) as < 34 weeks – but generally need 2 doses 24h apart

QUESTION 2 (13 marks)

A 5 year old has fed her 2 year old sister an unknown quantity of 100% eucalyptus oil 30 minutes ago.

- i. Briefly describe 3 of the possible clinical effects of eucalyptus oil poisoning (6 marks)
- CNS depression (minor if only 2 to 3 mL of 100% oil; severe if more than 7.5 mL of 100% oil)
 - Respiratory effects—aspiration and aspiration pneumonitis with cough, choking and respiratory distress
 - Gastrointestinal effects—nausea, vomiting, local mouth/oropharynx irritation
 - Cardiovascular effects—severe poisoning can cause hypotension, tachycardia

- ii. Outline the key aspects of the management of this child including any specific treatments or decontamination requirements (3 marks)

- Supportive care - mainstay of care eg intubate / ventilate to protect airway as needed.
- Specific treatments / antidotes? – no role. Gastrointestinal decontamination contraindicated because increased risk aspiration
- Role for decontamination? – no role, due to rapid absorption of the volatile oils.

One of the ED senior nurses mentions that she thinks this is the third paediatric eucalyptus oil ingestion that has presented to your ED in recent weeks.

- iii. List 4 steps that could be taken given this information (4 marks)

- Ascertain validity of the suspicion – e.g. search ED database (or ask clerical staff to do so), ask colleagues/staff
- If confirmed, steps should be taken to warn authorities & public
- Notify relevant stakeholders/authorities of possible “cluster” –
 - DEM, hospital exec
 - Regional Public Health Unit, local toxicology service
- Advise TGA or equivalent
- Local (in your ED) “advertising” warning people of danger
- Possible role for ACEM Public Health Unit
- In-house education program for staff

QUESTION 3 (19 marks)

- i. With regard to blunt abdominal trauma, complete the table with 2 pros and cons of each diagnostic modality (12 marks)

	PROS	CONS
FAST SCAN	<ul style="list-style-type: none"> • Sensitive and specific for free fluid • Rapid • Repeatable • Portable • Low risk 	<ul style="list-style-type: none"> • Does not identify if FF is blood • Operator-dependant • Does not image retroperitoneum • Difficult if obese / SC air / bowel gas
CT SCAN	<ul style="list-style-type: none"> • Precise location of lesion(s) • Images retroperitoneum • Not invasive • Can determine if injury suitable for conservative mx 	<ul style="list-style-type: none"> • Expense • Transport out of ED • IV contrast • Radiation
DIAGNOSTIC PERITONEAL LAVAGE	<ul style="list-style-type: none"> • Very sensitive for intra-abdominal bleeding • Readily available • Low complication rate • Early detection of bowel perforation • No radiation / contrast 	<ul style="list-style-type: none"> • Invasive • Iatrogenic injury • Not specific • Can't tell if injury suitable for non-operative mx • Not often used – deskilled / inexperienced staff

- ii. List two contraindications to performing a FAST exam in trauma. Provide an example for each (4 marks)
- Presence of a more critical problem e.g. airway obstruction
 - A clear indication for emergency laparotomy e.g. penetrating abdo trauma with haemodynamic instability
- iii. Bowel and mesenteric injuries are particularly associated with an abdominal “seatbelt sign”. What CT radiographic findings are classically seen in this injury (3 marks)
- Perforation – with leakage of oral contrast (if used), leakage of bowel contents or presence of free intra-abdominal gas
 - Mural haematoma/mural thickening
 - Abnormal bowel wall enhancement (e.g. from ischaemia)
 - Mesenteric injury with active extravasation of contrast
 - Haziness/fat stranding

QUESTION 4 (17 marks)

A 50 year old man has been bitten by a snake and presents to your ED 6 hours later. He has had no first aid. He is normally well, on no medications and has no pre-existing medical conditions. Initial blood tests demonstrate a marked coagulopathy and low fibrinogen.

- i. Which Australian elapids cause coagulopathy (4 marks)
 - Brown, Tiger, Taipan, Rough Scale, Red-Bellied, Mulga
The last two cause an anti-coagulant (not a VICC) coagulopathy
- ii. Which of the pathological effects of envenomation are reversed by appropriate anti-venom administration (4 marks)
 - Established pre-synaptic paralysis (e.g. Taipan)
 - Post-synaptic paralysis (e.g. Death Adder)
 - Anticoagulant coagulopathy
 - Rhabdomyolysis
 - Thrombotic microangiopathy

It is decided to give Brown Snake antivenom.

- iii. Detail how you will administer the antivenom (4 marks)
 - Monitored area, dilute 1 ampoule (dose controversial) in 100-500mL NS, infuse over 15-30 min, prepare for allergy
- iv. Outline your actions in the event of an allergic reaction to the antivenom (5 marks)
 - Cease/suspend AV infusion, give O₂, fluid bolus, IMI adrenaline 0.3-0.5mg lat thigh. Cautious recommencement of AV when under control. Occasionally need to titrate an adrenaline infusion while running AV

QUESTION 5 (17 marks)

You are the consultant in an urban ED, on a busy shift. You receive ambulance pre-notification about a domestic dispute. They are transporting 2 patients both with shotgun wounds. ETA is 10 minutes.

Patient 1: 46 year old male with wounds to his left chest and abdomen
GCS 12 (E3V4M5)
P 110
BP 80/-

Patient 2: 43 year old female with minor wounds to her left forearm
Vitals are stable

i. Outline 4 key issues involved in this scenario (4 marks)

- Critical injury – adequate personnel/trauma teams to attend
- Notifications – OT, CT, blood bank
- Busy department – ensure ongoing care for rest of department
- GSW – forensic evidence, documentation, police involvement
- Potential safety issue – patients, staff
Media – likely TV, press etc, media liaison

ii. The male patient is in shock despite 2 litres of normal saline pre-hospital. His GCS has fallen to 8. His chest is hyper-resonant on the right with bilaterally reduced breath sounds. He has an acute abdomen.
List 4 immediate management priorities (4 marks)

- Needs immediate right sided chest decompression + ICC (bilateral)
- Emergent intubation
- Fluid resuscitation, blood, MTP
- Exclude tamponade
- Move to OT as definitive management ASAP

iii. List 5 positive findings on the male patient's CXR (5 marks)

AN XRAY IS SHOWN IN THE PROPS BOOKLET, PAGE 3

- Multiple gun shot pellets over left hemithorax, possible mediastinum
 - ETT, possibly tip in RMB
 - Large right PTX with radiological tension
 - Right ICC crosses midline, requires new ICC or repositioning
- Fractured left sided ribs
- iv. The male has been transferred to theatre. While you are reviewing the female, the police ring to advise you of her husband's possible arrival. He is the suspected perpetrator, and may be armed.
Outline 4 key issues in your immediate response (4 marks)

- Request immediate police presence and hospital security
- Stakeholder notification – hospital exec, media
- Potential activation hospital code/disaster plan
- Notification of staff, including OT
- Remainder of ED requires ongoing care
- Attempt to secure department for patient/staff/visitor safety

QUESTION 6 (19 marks)

A 30 year old male is brought by ambulance to your Urban District ED from a local beach following a SCUBA dive. His dive buddy reports that the patient appeared to be behaving abnormally and possibly had brief seizure-type movements during their dive at a depth of 35 metres.

i. List 3 diving-related causes of confusion or behaviour change at depth (3 marks)

- Hypoxia – example from aspiration, breath-holding, gas supply failure
- Nitrogen narcosis
- Contaminated gas mix – example tanks filled near petrol-powered compressor with entrainment of CO
- Oxygen toxicity – if diving on high concentration O₂

Because of the problem at 35 metres, the buddy forced a rapid ascent and omitted a decompression stop at 10 metres. On the dive boat, the patient began to vomit and was very unsteady on his feet.

ii. List 3 differential diagnoses for this presentation and outline historical or examination features that would support each differential (9 marks)

Differential Diagnosis	Supporting Findings
Decompression Illness (“The Bends”)	Delayed onset after exiting water, subtle neuro findings (esp retention), associated symptoms (joint pains, rash)
Arterial Gas Embolism	Onset immediately on surfacing, stroke-type neuro findings, other arterial embolic/occlusive findings, associated PTx/pneumomediastinum or subcut gas
Vestibular dysfunction (e.g. perilymph fistula, cochlear catastrophe)	Exam c/w “peripheral” vertigo, positional, rotational sensation, nystagmus

- iii. Complete the following table of changes in bubble size with change (altitude or depth) from sea level (4 marks)

Altitude	10,000 feet	14 mL
	2,000 feet	11 mL
	Sea Level	10 mL
Depth	10 metres	5 mL
	20 metres	3.3 mL

- iv. List 3 relative contraindications to helicopter retrieval in this patient (3 marks)

- DCI/AGE – diving-related “bubble problems” because of Boyle’s Law
- Intra-cranial/intra-spinal air
- Other air if not decompressed (e.g. pneumothorax, bowel obstruction)
- Cardiac arrest requiring compressions (LUCAS et al may change this??)
- Aggressive, combative patient (risk to aircraft & crew unless adequately sedated/restrained)

QUESTION 7 (14 marks)

A 14 year old boy presents with a red, painful left eye. He recently had an URTI, but is otherwise well.

i. List 3 signs or symptoms that distinguish orbital from peri-orbital cellulitis (3 marks)

- Loss of vision
- Ophthalmoplegia
- Pain on eye movement
- Proptosis
- Conjunctival oedema

ii. Describe 3 routes of contracting orbital cellulitis (3 marks)

- Extension from peri-orbital structures: sinuses / face / globe / lacrimal sac
- Direct inoculation of orbit from trauma / surgery
- Haematogenous spread

iii. What are the 2 most common organisms causing orbital cellulitis? (2 marks)

- Streptococcus pneumonia / pyogenes
- Staph aureus
- Haemophilus influenza

iv. List 2 complications of orbital cellulitis (2 marks)

- Visual loss
- Sinusitis
- Septicaemia
- Cavernous sinus thrombosis
- Osteomyelitis / Meningitis / Orbital abscess

- v. Complete the table with the standard antibiotics recommended for use in each listed situation. Doses not required (4 marks)

Situation	Antibiotic
Periorbital cellulitis	Di/flucloxacillin or cephalexin
Periorbital cellulitis with immediate penicillin hypersensitivity	Clindamycin
Periorbital cellulitis in unvaccinated child	Amoxicillin + clav or cefuroxime
Orbital cellulitis	Cefotaxime or ceftriaxone + flucloxacillin IV

QUESTION 8 (13 marks)

An 83 year old man presents with a 2 week history of lethargy, anorexia and dehydration. He has a past history of atrial fibrillation.

An ECG is obtained at triage.

- i. Describe the key features of the ECG (3 marks)

AN ECG IS SHOWN IN THE PROPS BOOKLET, PAGE 4

- Underlying atrial activity likely fibrillation (seen best in inferior leads)
 - Regular ventricular response at 65/min
 - Regular QRS in context of AF suggests complete block of A-V conduction
 - Wide QRS complexes consistent with ventricular escape (or “accelerated idioventricular”)
 - Rightward axis, tall left “rabbit ear” in V1
- ii. List 3 possible causes of these ECG abnormalities (3 marks)
- Digoxin toxicity
 - Hyperkalaemia
 - Acute ischaemia
 - TCA toxicity
 - Beta blocker toxicity
 - Calcium channel blocker toxicity

His blood results show

K 6.4 mmol/L

Urea 20 mmol/L

Cr 200 umol/L

Digoxin 3.0 nmol/L

His HR has dropped to 30 with a SBP 100.

iii. List 5 treatment steps (5 marks)

- Bicarbonate 100 mEq
- Insulin 10 units with 50% Glucose 50 mL
- Atropine
- Digoxin Fab 2 ampoules empirically
- External pacing (rarely effective)
- Adrenaline (rarely effective without dig Fab)

iv. Briefly explain the controversy surrounding the use of intravenous calcium in this setting (2 marks)

- In theory (and in limited case reports) calcium can exacerbate digoxin toxicity (“stone heart”) and it is widely said to be contra-indicated
- However frequently these patients will be hyperkalaemic and if delay to getting digoxin level, empiric Tx with calcium probably acceptable

QUESTION 9 (19 marks)

There has been a collision between a passenger train and a goods train. There are a large number of serious casualties and there has possibly been a spill of an unknown industrial chemical.

- i. A standardized protocol is used to convey essential information from the scene of a mass casualty incident or disaster. What initial information should be communicated to central authorities (7 marks)

- M Major Incident
- E Exact location
- T Type of incident
- H Hazards at scene
- A Access and egress routes
- N Number of casualties involved
- E Emergency services present and requested

- ii. Complete the table describing each disaster “zone” and outlining the roles or tasks typically carried out in the zone (6 marks)

Zone	Description/Roles/Tasks
Hot	<p>Actual disaster area (e.g. in & immediately around the trains)</p> <p>Specialized & authorised rescue personnel only – search/rescue of victims to be evacuated to warm zone</p>
Warm	<p>Area immediately outside hot zone</p> <p>Decontamination area (if required)</p> <p>Triage of casualties</p> <p>Safe areas for personnel</p>
Cold	<p>Outside warm zone – free of contamination</p> <p>Casualty collection & treatment areas</p> <p>Transport (road/helo) collection areas</p> <p>Assembly point for non-injured/ambulatory</p> <p>Perimeter - controlled access</p>

iii. List 3 advantages of “sieve” triage over “sort” triage (3 marks)

- Simplicity
- Speed – less than a minute
- No equipment required
- Minimal training required – can be performed by non-clinical personnel

iv. Describe how “sort” triage is carried out (3 marks)

- Triage based on assessment of physiological parameters
- Scores assigned for each of RR, SBP and GCS to calculate a Triage Revised Trauma Score (TRTS) – maximum score = 12
- Category (red, orange, green, etc) assigned based on calculated score (12= Green, 11= orange/yellow, 1-10= red, 0= dead)