Candidate number _____

Northern Sydney Hospitals/NSW HETI Network 2

# FELLOWSHIP EXAMINATION PRACTICE PAPER

2016.1

## 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

Candidate number _____

QUESTION 1 (25 marks) – DOUBLE QUESTION

A 42 year old man is brought by ambulance after completing a long distance bicycle race. Since the race his wife reports he has been acting strangely and fainted twice. She was told by his fellow cyclists that he had drunk plenty of water and had not fallen off his bike.

His vital signs are:

Temp: 39.5 degrees (per rectal)
HR: 122 regular
BP: 100/45
GCS: 14

i. List 5 potential causes for this man's symptoms and signs (5 marks)

_____

_____

_____

_____

_____

ii. List 5 investigations that you think are the most important and their rationale (10 marks)

| INVESTIGATION | RATIONALE |
|---|---|
| | |
| | |
| | |
| | |
| | |

iii. The patient's temperature rises to 41 degrees (per rectal). Outline 4 actions in your initial management (4 marks)

_____

_____

_____

_____

iv. Despite resuscitative efforts the patient's temperature rises to 42 degrees and he has a generalised seizure. Outline 6 treatment priorities now. Provide doses and end points where appropriate (6 marks)

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Candidate number _____

QUESTION 2 (11 marks)

A 51 year old lady presented having been seen in your ED 3 days ago after an MVA. A senior registrar reviewed her and a full trauma assessment was performed. No major injuries were found. She complained of foot pain prior to discharge and an x-ray was performed. The discharge letter states no fracture, and she was advised to treat this as a sprain. She represents with ongoing pain and is now unable to weight bear.

**AN XRAY OF THE FOOT IS SHOWN IN THE PROPS BOOKLET, PAGE 3**

i. Describe the main abnormality in this x-ray and the likely diagnosis (2 marks)

_____

_____

ii. List 3 fractures which can occur in association with this injury (3 marks)

_____

_____

_____

iii. The patient is angry about the missed injury and states she is going to make a complaint. Briefly outline how you would address this complaint (6 marks)

_____

_____

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Candidate number _____

QUESTION 3 (16 marks)

A 26 year old man presents with a 3 day history of sharp central chest pain suggestive of pericarditis. His observations are stable apart from a temp of 38C.

**THE ECG IS SHOWN IN THE PROPS BOOKLET, PAGE 4**

i. List the ECG abnormalities (3 marks)

_____

_____

_____

ii. What ECG features would make a diagnosis of benign early repolarisation more likely? (2 marks)

_____

_____

iii. List 5 causes of pericarditis (5 marks)

_____

_____

_____

_____

_____

iv. List 3 investigations used to detect a pericardial effusion in this setting – include a brief description of the positive finding for each investigation (6 marks)

_____

_____

_____

_____

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Candidate number _____

QUESTION 4 (13 marks)

You are at a peripheral hospital with no maternity facilities when a 16 year old obese girl presents in the second stage of labour. Up until this presentation she was unaware that she was pregnant.

i. List 5 steps you would take to prepare for her delivery (5 marks)

_____

_____

_____

_____

_____

Within minutes of arrival the baby's head is delivered. However on the next contraction you are unable to deliver the shoulders despite gentle axial traction.

ii. Name this condition and in what period of time should the baby be delivered to avoid serious foetal hypoxia (2 marks)

_____

_____

iii. Describe 3 manoeuvres that may enable the safe delivery of the child (6 marks)

_____

_____

_____

_____

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Candidate number _____

QUESTION 5 (21 marks)

A concerned first-time mother has brought her 2-week-old baby to the ED because the baby is jaundiced.

i. What is the name of the pathological condition caused by neonatal jaundice? (1 mark)

_____

ii. If left untreated, what are 2 sequelae of this condition? (2 marks)

_____

_____

iii. List 2 benign causes of neonatal jaundice (2 marks)

_____

_____

iv. List 4 pathological causes of neonatal jaundice (4 marks)

_____

_____

_____

_____

v. What 5 historical features will guide your assessment of this child? (5 marks)

_____

_____

_____

_____

_____

vi. How can a serum bilirubin assist your assessment? (2 marks)

_____

_____

vii. List 5 other investigations you might consider (5 marks)

_____

_____

_____

_____

_____

Candidate number _____

QUESTION 6 (15 marks)

A 65 year old woman presents to ED with lower back pain and normal observations. She has a history of type 2 diabetes but is otherwise well. There is no history of trauma.

i) List 6 historical features which may suggest serious pathology (6 marks)

_____

_____

_____

_____

_____

_____

ii) After taking your history you are concerned about possible cauda equina syndrome. List 4 examination findings which would support your diagnosis (4 marks)

_____

_____

_____

_____

iii) List the most important immediate investigation and the most important treatment if this condition is confirmed (2 marks)

_____

_____

iv) List the most common cause, and 2 other causes for cauda equina syndrome (3 marks)

_____

_____

_____

QUESTION 7 (15 marks)

A 62 year old male is brought to ED by ambulance after falling 4 metres from a ladder, sustaining a head injury. Primary survey is unremarkable apart from a significant head injury. There is an obvious swelling to the left side of his face and it is difficult to open his left eye.

Observations are:

HR 100, BP 100/60, SaO2 99% RA, RR 16, GCS 6

i. You elect to undertake an RSI to secure his airway prior to imaging. Complete the tables below:

a) List 2 possible sedative drugs and doses you could use to facilitate RSI (4 marks)

b) List one potential positive and one potential negative aspect of each drug's pharmacodynamics in this patient (4 marks)

| Drug | | |
|---|---|---|
| Dose | | |
| Positive pharmacodynamics specific to head injured patient | | |
| Negative pharmacodynamics specific to head injured patient | | |

ii. List 4 positive findings from the 2 axial CT images (4 marks)

**2 AXIAL IMAGES OF A CT BRAIN ARE SHOWN IN THE PROPS BOOKLET, PAGE 5 & 6**

_____

_____

_____

_____

iii. Neurosurgery review the patient and are keen to take the patient to theatre urgently. A lateral canthotomy is also suggested. List 3 signs in an unconscious patient that would suggest a need for urgent lateral canthotomy (3 marks)

_____

_____

_____

Candidate number _____

QUESTION 8 (15 marks)

You have agreed to be the expedition doctor for a trek to the Everest base camp. (altitude 5300m)

i. Outline the proposed pathophysiology of:

Acute Mountain Sickness (AMS)/High Altitude Cerebral Oedema (2 marks)

_____

_____

_____

_____

High Altitude Pulmonary Oedema (2 marks)

_____

_____

_____

_____

ii. List 2 risk factors for the development of High Altitude Pulmonary Oedema at any given altitude (2 marks)

_____

_____

_____

_____

iii. List 5 clinical features of AMS (5 marks)

_____

_____

_____

_____

_____

iv. For severe High Altitude Pulmonary Oedema, list 4 treatment options (4 marks)

_____

_____

_____

_____

Candidate number _____

QUESTION 9 (18 marks)

You are on duty in a small urban district hospital. You attend to an 8 year-old boy who was rescued from the bottom of a saltwater backyard pool, unconscious. He was resuscitated by pre-hospital personnel and presents with the following vital signs:

HR 72 bpm, regular

BP 90/60 mmHg

RR 24 bpm

$SaO_2$ 100 % on high flow oxygen

i. Outline 5 key features in your examination of this child (5 marks)

_____

_____

_____

_____

_____

ii. List 5 factors which determine this child's prognosis (5 marks)

_____

_____

_____

_____

_____

iii. The child's GCS improves to 14. Despite high flow "non-rebreather" mask oxygen, he shows signs of respiratory distress from aspiration pneumonitis. Complete the table outlining 3 escalating modalities that could be used to improve his oxygenation. Describe initial settings and sizes as appropriate (6 marks)

| Treatment/modality | Settings |
|---|---|
| | |
| | |
| | |

iv. List 4 potential disadvantages of the use of non-invasive mask ventilation (CPAP or BiPAP) for this child in the aero-medical retrieval context (4 marks)

_____

_____

_____

_____

Candidate number _____

# BOOK TWO

Candidate number _____

QUESTION 10 (24 marks) – DOUBLE QUESTION

Ambulance officers are bringing a 5-month old baby to your ED, in cardiac arrest. You have a few minutes to prepare your drugs and equipment.

i. Complete the table below (10 marks)

| | Formula/calculation | Answer |
|---|---|---|
| Estimated weight | | |
| ETT size | | |
| DC shock joules | | |
| Adrenaline dose | | |
| 10% glucose dose | | |

ii. Complete the table below identifying the recommended compression:ventilation ratio for each group (3 marks)

| Group | Ratio |
|---|---|
| Neonatal | |
| Paediatric | |
| Adult | |

iii. Briefly explain the rationale for different compression ratios in these populations (2 marks)

_____

_____

iv. Briefly explain why the ratio recommended for lay provider BLS is constant across age groups (1 mark)

_____

_____

v. The child regains spontaneous circulation but is agitated and requires a rapid sequence induction. Please list the drugs you will choose, including doses (6 marks)

| Drug | Dose/kg | Dose |
|---|---|---|
| | | |
| | | |

vi. Increasingly cuffed endotracheal tubes are used in paediatric intubations. Briefly explain why, historically, uncuffed tubes were preferred (2 marks)

_____

_____

Candidate number _____

QUESTION 11 (17 marks)

A 75 year old man has been resuscitated following an out-of-hospital cardiac arrest. He has been taken to a small regional Emergency Department. He was intubated at scene. His past history is unknown but paramedics have brought a bag of his normal medications: frusemide, spironolactone, digoxin and warfarin.

**THE PATIENT'S ECG IS SHOWN IN THE PROPS BOOKLET, PAGE 7**

i. What are the 3 main findings in this ECG? (3 marks)

_____

_____

_____

ii. List 3 potential causes of the dysrhythmia in this patient (3 marks)

_____

_____

_____

iii. A retrieval team has been dispatched by helicopter with an estimated flight time of 2 hours. For the safe transfer of this patient, list the minimum monitoring modalities required (5 marks)

_____

_____

_____

_____

_____

iv. Complete the following table, listing 3 common issues with the helicopter transport environment and their potential effects on patient assessment/management (6 marks)

| Issue | Effects |
|---|---|
| | |
| | |
| | |

QUESTION 12 (14 marks)

A 36 year old woman presents with a very sudden onset severe headache 5 hours ago. It is suspicious for subarachnoid haemorrhage (SAH).

(i) Apart from headache, list 4 other clinical features that may be present in SAH (4 marks)

_____

_____

_____

_____

(ii) Complete the table providing estimates where indicated (3 marks)

| Situation | Estimate |
|---|---|
| Prevalence of confirmed SAH in a patient with a classic history of "thunderclap" headache | |
| Sensitivity of new generation CT scanning in detecting SAH in this setting | |
| Incidence of "traumatic tap" when performing a lumbar puncture (LP) | |

(iii) The CT scan of this patient is reported as normal and a decision made to perform a lumbar puncture to look for xanthochromia. Name the two red cell breakdown products that can cause yellow discolouration of CSF (2 marks)

_____

_____

(iv) List 5 criteria that indicate that a CT scan should be carried out prior to lumbar puncture (5 marks)

_____

_____

_____

_____

_____

QUESTION 13 (15 marks)

A 72 year old male is brought to ED by family with pain and swelling in his left calf for the last 24 hours. He has a history of myelodysplasia and denies trauma. On examination the calf is swollen and tender.

i. List 4 possible causes of his calf pain (4 marks)

_____

_____

_____

_____

In the ED, the patient continues to complain of pain despite opiate analgesia. His leg is increasingly swollen and now is erythematous with palpable crepitus. Vital signs are as follows:

GCS 15

Temp 37.8C

HR 120

BP 66/40

Sats 96% RA

ii. List your immediate management priorities in this patient. Include drugs, doses and end points where appropriate (5 marks)

_____

_____

_____

_____

_____

iii. List 3 risk factors for this condition (3 marks)

_____

_____

_____

iv. The patient's hypotension remains refractory to fluid treatment and you decide to start vasoactive therapy. Give an example of a suitable medication for this patient with typical dosing/concentrations and treatment end points (3 marks)

_____

_____

_____

Candidate number _____

QUESTION 14 (12 marks)

A 5 month old boy brought in by his parents appears breathless and is “off his feeds.” Your provisional impression is bronchiolitis.

i. Name three common organisms which cause this illness (3 marks)

_____

_____

_____

ii. List 4 clinical features which would indicate a severe episode warranting admission (4 marks)

_____

_____

_____

_____

iii. Complete the following table describing the rationale for each investigation in a child with bronchiolitis (3 marks)

| Investigation | Indication/Rationale |
|---|---|
| Chest Xray | |
| Nasopharyngeal aspirate | |
| Blood gas | |

iv. This illness is contagious. List 2 ways to reduce transmission in hospital (2 marks)

_____

_____

Candidate number _____

QUESTION 15 (15 marks)

A 27 year old man climbed over an electricity sub-station fence and sustained an electrical injury while grabbing a metal pole with his right hand. He arrives 30 minutes later complaining of tingling in his right arm and a numb left foot.

**A CLINICAL PHOTOGRAPH IS SHOWN IN THE PROPS BOOKLET, PAGE 8**

i. Describe the wound seen on the foot (1 mark)

_____

_____

Question continues next page

ii. Complete the table outlining factors that determine the severity of an electrical injury (8 marks)

| Category | Explanation |
|---|---|
| Voltage | |
| Current | |
| Resistance | |
| Type of current | |

iii. For each of the three categories below, what specific injuries or problems may occur in the patient described in the stem? For each, describe the patho-physiological process (6 marks)

| | Injury | Pathophysiology |
|---|---|---|
| Cardiac | | |
| Nervous system | | |
| Limb/soft tissue | | |

QUESTION 16 (19 marks)

An 80yr female presents via ambulance from her GP to your ED. She has a 24 hour history of vomiting, followed by syncope this morning. She had a second syncope at her GPs office and was noted to be bradycardic on ambulance arrival.

Observations on arrival to ED are:

GCS 15

HR 76

BP 85/30

RR 18

SaO2 96% RA

She describes no chest pain, has had a recent course of antibiotics for a chest infection and has started on a "new drug for my memory".

**THE PATIENT'S AMBULANCE RHYTHM STRIP AND ARRIVAL ECG ARE SHOWN IN THE PROPS BOOKLET, PAGE 9 & 10**

i. List 3 relevant findings from the 12 lead ECG (3 marks)

_____

_____

_____

_____

ii. List 3 causes of the ECG abnormalities in this patient (3 marks)

_____

_____

_____

iii. List your management priorities (4 marks)

_____

_____

_____

_____

She becomes bradycardic to 35 again, and her BP drops to 75/30 with a rhythm matching the initial ambulance ECG strip.

iv. What is her likely diagnosis? (1 mark)

_____

v. You decide to initiate transcutaneous pacing for her transfer to ICU. Outline your approach (5 marks)

_____

_____

_____

_____

_____

Candidate number _____

QUESTION 17 (16 marks)

A 40-year-old female who is Day 3 post-partum has been brought in following increasing confusion and agitation at home.

In the ambulance she had a generalised tonic-clonic seizure which stopped with 5mg IMI midazolam.

When you arrive she is being nursed on a bed in the Resuscitation Room.

On examination:

Airway: snoring / partly obstructed
RR 40, O2 saturations 95%
HR 130, BP 180/100
Decreased LOC – drowsy, post-ictal, GCS 9

i. Apart from eclampsia, list the causes of seizure you would consider in this patient (4 marks)

_____

_____

_____

_____

ii. List 3 risk factors for pre-eclampsia/eclampsia (3 marks)

_____

_____

_____

iii. What examination features would increase your level of suspicion that this seizure is eclamptic in origin? (3 marks)

_____

_____

_____

iv. Outline your initial management in each category below. Include drugs/dose/route (where appropriate) that you would administer (6 marks)

| Category | Management |
|---|---|
| General management & resuscitation | |
| Pharmacotherapy of eclampsia/pre-eclampsia | |

QUESTION 18 (16 marks)

A 25 year old man presents 6 hours after a SCUBA dive with possible decompression sickness (DCS).

i. List 6 questions specific to diving you should ask in your history (6 marks)

_____

_____

_____

_____

_____

_____

ii. Complete the table listing 3 symptoms or signs of DCS in each category (6 marks)

| Category | Symptom/Sign |
|---|---|
| Neurological | |
| Other | |

iii. Complete the table contrasting DCS and Arterial Gas Embolism (AGE) (4 marks)

| | DCS | AGE |
|---|---|---|
| Pathophysiology | | |
| Time of onset | | |

Candidate number _____

# BOOK THREE

Candidate number _____

QUESTION 19 (21 marks) – DOUBLE QUESTION

A 70 year old man presents with ischaemic-sounding chest pain on a background of longstanding, poorly controlled hypertension. His 12-hour troponin is normal.

**THE PATIENT'S ECG IS SHOWN IN THE PROPS BOOKLET, PAGE 11**

i. List 4 abnormalities in this ECG (4 marks)

_____

_____

_____

_____

ii. List 5 causes of ST segment elevation other than myocardial ischaemia (5 marks)

_____

_____

_____

_____

_____

iii. The patient is noted to have a systolic heart murmur. List 6 differential diagnoses of a systolic murmur (6 marks)

iv. You suspect this patient has aortic stenosis. What are the physical signs that suggest severe aortic stenosis? (4 marks)

v. Your registrar wants to commence a nitrate infusion for this man's angina. Outline your concerns about this plan (2 marks)

QUESTION 20 (14 marks)

A 42-year-old man is brought to your ED by ambulance with acute confusion. His health has been deteriorating for three months, with tiredness & 10kg weight loss despite an enormous appetite. He is on no medications.

Observations on arrival are:

HR 140

BP 180/100

RR 40

SaO2 100%

GCS 13

Temp 38.5

BSL 10

i. List the most likely diagnosis (1 mark)

_____

ii. List 4 differential diagnoses (4 marks)

_____

_____

_____

_____

iii. List 4 problems that may precipitate the most likely diagnosis (4 marks)

_____

_____

_____

_____

iv. List 5 treatment priorities in ED (5 marks)

_____

_____

_____

_____

_____

QUESTION 21 (11 marks)

Ambulance officers bring a 68 year old man with severe back pain to your ED. He is shocked (BP 80/50mm Hg). Your trainee has performed a bedside ultrasound and obtained this image.

**A CLINICAL IMAGE IS SHOWN IN THE PROPS BOOKLET, PAGE 12**

i. Describe the image (2 marks)

_____

_____

ii. List the most likely diagnosis and one differential diagnosis (2 marks)

_____

_____

The on-call vascular surgical registrar has asked you to continue to resuscitate the patient and get an urgent CT while he organises theatres.

iii. What is the role of CT scanning in this setting? (2 marks)

_____

_____

_____

_____

iv. List the key steps in your ongoing resuscitation and preparation for theatres (5 marks)

_____

_____

_____

_____

_____

Candidate number _____

QUESTION 22 (13 marks)

You are the retrieval doctor at a pre-hospital scene where there has been a single-occupant rollover MVA. The driver has been trapped for 2 hours by extensive compression of both legs by dashboard and steering column intrusion. He has chest and head injuries (GCS 7)

i. What are the potential pathophysiological consequences of rapid release of this patient's legs? (2 marks)

ii. What therapies could you use to mitigate these pathophysiological consequences? (3 marks)

On arrival at the nearby trauma centre, concerns are raised about the possibility of a bilateral lower leg compartment syndrome.

iii. Outline a technique for measuring compartment pressures (4 marks)

iv. What pressure threshold would confirm suspicions of compartment syndrome? (1 mark)

v. The patient's creatine kinase is 7000 IU/L. The renal registrar wants you to start a mannitol infusion to reduce renal injury from tubular deposition. List 3 disadvantages or adverse effects of mannitol in this context (3 marks)

Candidate number _____

QUESTION 23 (13 marks)

A 24 year old woman with a history of asthma presents with dyspnoea, dizziness and pleuritic chest pain for 24 hours. She appears tired, her pulse is 135bpm, and has mottled peripheries. A CXR is performed in the resuscitation room.

**THE CHEST XRAY IS SHOWN IN THE PROPS BOOKLET, PAGE 13**

i. List 3 positive and 2 negative findings on the CXR (5 marks)

Positive

_____

_____

_____

Negative

_____

_____

ii. List 4 immediate management steps (4 marks)

_____

_____

_____

_____

iii. List 4 complications of definitive treatment of this problem (4 marks)

_____

_____

_____

_____

Candidate number _____

QUESTION 24 (15 marks)

You are at a peripheral hospital with no paediatric or neonatal facilities when a 23 year old female presents in advanced labour. You have been asked to care for the baby after birth.

i. List 5 of the most important factors that the mother or baby may have that will increase the risks of the infant needing resuscitation (5 marks)

_____

_____

_____

_____

_____

ii. List 3 ways you can estimate the gestational age of the infant (3 marks)

_____

_____

_____

iii. On delivery, the baby is limp, with poor respiratory effort and a HR of 90/min. List 5 of your immediate actions to resuscitate the baby (5 marks)

_____

_____

_____

_____

_____

iv. If this is a term infant should you resuscitate with air or a higher concentration of oxygen? Provide reasons for your answer (2 marks)

_____

_____

Candidate number _____

QUESTION 25 (19 marks)

i. Complete the table comparing lightning vs high voltage injury (10 marks)

| Factor | Lightning | High Voltage AC |
|---|---|---|
| Current duration | | |
| Current characteristics | | |
| Energy level | | |
| Cardiac arrest initial rhythm | | |
| Tissue damage | | |

ii. There are several different types of lightning strike. List 2 types and briefly describe them (4 marks)

| Type of strike | Description |
|---|---|
| | |
| | |

iii. Describe 2 clinical features which are considered pathognomonic for lightning strike (2 marks)

_____

_____

iv. List 3 other clinical features seen in lightning strike (3 marks)

_____

_____

_____

Candidate number _____

QUESTION 26 (14 marks)

A 67 year old male with a urethral catheter in situ for 2 months, awaiting TURP, presents with a blocked IDC which has been changed. Routine pathology tests were performed.

| | | | |
|---|---|---|---|
| Na 137 | (135-145) | Bilirubin 5 | (3-20) |
| K 4.3 | (3.5-5.2) | Prot 68 | (60-80) |
| Cl 104 | (95-110) | Alb 38 | (32-46) |
| Bic 22 | (22-32) | ALP 585 | (30-110) |
| Urea 5.2 | (3-8) | GGT 47 | (9-36) |
| Creat 67 | (45-90) | ALT 13 | (<55) |
| eGFR 94 | (>60) | AST 39 | (12-36) |

i. List 2 possible causes for the pathology abnormality (2 marks)

_____

_____

ii. List 3 further pathology tests you would perform and provide reasoning (6 marks)

| Test | Clinical reasoning |
|---|---|
| | |
| | |
| | |

iii. List 5 malignancies that metastasize to bone (5 marks)

_____

_____

_____

_____

_____

iv. What type of bony metastases occurs in prostatic malignancy? (1 mark)

_____

Candidate number _____

QUESTION 27 (19 marks)

A 67 year old woman has presented having found her blood pressure to be 205/130 on her home BP machine.

i. Define hypertensive emergency (2 marks)

ii. An image of the patient's retina is shown. Name two abnormalities seen (2 marks)

**A CLINICAL PHOTOGRAPH IS SHOWN IN THE PROPS BOOKLET, PAGE 14**

iii. List and justify 3 blood tests you might order in this patient (6 marks)

| Blood Test | Justification |
|---|---|
| | |
| | |
| | |

iv. Acute lowering of BP in profoundly hypertensive patients is indicated in a number of specific settings. Complete the table including two medications for each condition listed (doses not required). Identify the therapeutic goal and the blood pressure target (12 marks)

| Diagnosis | Preferred agents (2 marks each) | Goal/Target (2 marks each) |
|---|---|---|
| Aortic dissection | | |
| Myocardial ischaemia | | |
| Intracerebral haemorrhage | | |