Candidate number _____

BOOK TWO

Candidate number _____

QUESTION 10 (25 marks) - DOUBLE QUESTION

An 18 year old male is brought to your small rural ED by his parents. He had a VP shunt inserted for hydrocephalus at age 10, with the last revision 3 years ago. He has had increasing headache and vomiting for the last two days and is now confused.

Vital signs are:

T	37.3 degrees (per axilla)
P	114 regular
BP	140/70
GCS	14

i. List 5 potential causes for this presentation (5 marks)

- Shunt blockage, Shunt infection
- Hypoglycaemia
- Hypo / hypernatraemia
- Encephalitis / meningitis
- DKA
- SAH/ICH
- Toxidrome

ii. List the initial laboratory investigations you would perform including your rationale (10 marks)

Investigation	Rationale

- BSL / glucose
- Na
- VBG
- Lactate
- Urea / creat
- LP / shunt reservoir aspiration
- Above with sensible rationale

iii. A CT brain shows marked hydrocephalus. The patient becomes drowsy and has a tonic clonic seizure. Outline your initial five treatment steps (5 marks)

- Oxygen
- IV benzodiazepine – including correct dose / kg
- IV phenytoin / levetiracetam – including correct dose / kg
- IV osmotic agent - hypertonic saline / mannitol
- Consider IV antibiotic/IV antiviral – appropriate choice and dose
- Safe correction of any electrolyte / glucose abnormality

iv. Despite your treatment, his seizures persist for the next 30 minutes. What five further steps would you take (5 marks)

- Intubation – appropriate C02 control
- IV phenobarbitone
- IV osmotic agent if not given prior
- Shunt reservoir aspiration
- Discussion with neurosurgeon
- Discussion with retrieval service

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QUESTION 11 (16 marks)

A 2 year old boy has ingested iron tablets. He presents with his mother and he currently seems well. You calculate that he has possibly ingested 90mg/kg elemental iron.

i. Complete the table (4 marks)

Elemental iron dose	System involved/Effects
<20mg/kg	Asymptomatic
20-60mg/kg	GIT
>60-120mg/kg	Multi organ failure
>120mg/kg	Potential lethal

ii. Complete the table of classical stages of iron toxicity (5 marks)

Time post ingestion	Clinical features
0-6 hours	Vomit, diarrhea, abdominal pain, haematemesis, melaena
6-12 hours	Some improvement
12-48 hours	Multi organ failure: shock, AG metabolic acidosis, liver failure, renal failure
2-5 days	Fulminant liver failure
2-6 weeks	Delayed sequelae: cirrhosis, GIT strictures

iii. You obtain an Xray. List 2 relevant findings (2 marks)

AN XRAY IS SHOWN IN THE PROPS BOOKLET, PAGE 5

- Right upper zone dense consolidation
- No evidence of gastric iron tablets

iv. How does this xray alter your management plan (2 marks)

- PO iron unlikely - No need to plan decontamination via endoscopy or WBI
- Other complications - May need bronchoscopy to remove inhaled Fe tablets

v. List 3 blood tests that you will order and your reasoning for doing so (3 marks)

- Serum Fe level at 4-6 hours – confirm absorption
- Lactate
- Acid base calculation on VBG
- EUC to calculate AG

QUESTION 12 (13 marks)

A 40 year old man is brought to your tertiary ED after being found unconscious in a police watch house cell. It appears he hanged himself with a belt, tied to a ceiling beam. Ambulance personnel report the following at handover:
GCS 5
Temp 37 deg C
P 110, BP 180/90
RR 16, spontaneous respirations, with stridor

i. Outline 4 key issues in the immediate management of this patient (4 marks)

- Needs urgent intubation – anticipate difficult airway
- Determine neuro status prior to RSI
- Manual C spine immobilization to be considered
- Neuroprotective measures
    - Head up 30deg
    - Collar off
    - Oxygenation, avoid hypercarbia
    - Sedation/paralysis

Reasonable MAP

ii. List 4 prognostic indicators for this patient's outcome (4 marks)

- Down time; first aid/BLS rendered, initial vital signs and GCS
- Cardiac arrest at scene
- Comorbidities
- Previous/current injuries
- Estimated height of hanging fall; potential for C spine injury

iii. The patient is successfully intubated and ventilated, but develops high airway pressures a short time later. List 5 possible causes (5 marks)

- Pneumothorax
- RMB intubation
- Aspiration
- Airway trauma
- Bronchospasm
- Patient ventilator dyssynchrony

QUESTION 13 (23 marks)

A 2 year old girl is brought to ED by her mother, who tells you her daughter has been reluctant to weight bear. The mother tells you that her daughter pulled a drawer full of cutlery onto her foot yesterday afternoon.

i. Outline four key points of your physical examination of this patient (4 marks)

- Examine entire child for signs of acute or previous injury – undress the child completely – child is pre-verbal, symptoms very imprecise
- Examine foot for signs of injury – skin, bone, soft tissues – look/feel/move
- Examine entire leg for signs of injury – including gait
- Assess the interaction between mother and child – any signs of distress/inappropriate behaviour?
- Approach the child with gentle manner, build rapport and trust
- Be opportunistic – examine in the order the child allows
- Consider small dose of simple analgesia (paracetamol 15mg/kg or ibuprofen 10mg/kg) to allow more detailed examination
- Consider RICE to allow more detailed examination

ii. A femur and knee Xray is performed. Describe your findings (1 mark)

AN XRAY IS SHOWN IN THE PROPS BOOKLET, PAGE 6

- Spiral undisplaced midshaft femur fracture

iii. Describe three pharmacological options for analgesia in this patient. Provide drug names, doses, dosing intervals, route of administration, and possible adverse effects (9 marks)

NAME	Dose/Route of administration	Adverse effects
Fentanyl	1.5mcg/kg, repeat after 5-10 mins with 0.75-1.5mcg/kg, intranasal	sedation, cardiorespiratory depression, nausea/vomiting, itch, epistaxis
Paracetamol	15mg/kg, 4-6 hourly, oral or IV	hypotension (IV)
Morphine	0.1mg/kg IM, 0.05-0.1mg/kg IV – titrate dose every 5 minutes to visual pain scale/sedation level	sedation, cardiorespiratory depression, nausea/vomiting, itch, allergy
Oxycodone	0.1-0.2mg/kg orally, 4-6 hourly	as per morphine, some patients may not metabolise well and will have reduced effects
Ibuprofen	10mg/kg orally 6-8 hourly	bleeding (anti-platelet effect), GIT irritation, bronchospasm, nephrotoxicity (unlikely in therapeutic dose range)

iv. List five features which might suggest a non-accidental cause of injury in this patient (5 marks)

- Injuries inconsistent with history provided/description of mechanism
- Presence of old/unexplained injuries on thorough physical examination
- Injuries typical of abuse – eg cigarette burns
- Delayed presentation
- Inappropriate interaction between mother and child – mother angry, withdrawn, seems drug-affected etc
- Previous presentations with injuries
- Mechanism of injury not consistent with child's developmental level
- Child has chronic illness/disability

v. The mother decides to discharge the child against medical advice prior to formal splinting and orthopaedic referral. Outline four steps you will take to protect this child (4 marks)

- Talk to the mother yourself, address her concerns, try to convince her to stay for treatment, inform her re her rights and responsibilities to her child
- Assess mother's competence to make decisions
- Notify child-at-risk unit re legal assistance detaining patient in ED
- Excellent and thorough documentation
- Seek assistance from related specialties – eg paeds, orthopaedics – try to get urgent involvement
- Notify hospital executive re situation
- Try to involve staff member who has had good rapport with mother involved – eg if she liked the nurse, then get the nurse to do the talking

QUESTION 14 (13 marks)

A 51 year old man is brought in by ambulance having fallen onto his back from 10 metres. He has no significant past medical history, and is on no medications.

His observations on arrival are:

GCS 15, P 110, SBP 70, RR 20, SaO2 99% 6L Hudson mask

i. List the 3 most important findings on the portable pelvic Xray (3 marks)

AN XRAY IS SHOWN IN THE PROPS BOOKLET, PAGE 7

- Left sacral ala
- Superior and inferior left pubic ramus
- Disrupted PS
- Significant disruption of pelvic and obturator rings
- Pelvic binder in situ

ii. What is the Young classification of injury (1 mark)

- Vertical shear

iii. List 5 treatment priorities in this patient (5marks)

- Volume resuscitation – sensible, urgent O neg, should mention hypotensive resuscitation, no/minimal crystalloid, end points
- Immobilisation – pelvic splint, no movements
- Analgesia – sensible, probably ketamine, maybe opiates
- Seek and treat other sources of haemorrhage
- Early consultation with surgery, interventional radiology

iv. Describe 4 essential elements of a massive transfusion protocol (4 marks)

- Early communication – blood bank, haematology
- Baseline lab investigations – FBP, coags, biochem
- Clinical triggers
- Product ratios 1:1:1
- Monitoring and treatment of complications – acidosis/coagulopathy/hypothermia/Ca
- Documentation
- QA – audit
- Others

QUESTION 15 (24 marks)

There has been a 3-day heat wave involving the south-eastern region (parts of NSW, Victoria and South Australia) with daytime temperatures 38-40 degrees Celsius and overnight minimum temperatures of 28-30 degrees Celsius.

i. List 4 groups who are particularly at risk of developing non-exertional heat-related illness and include your reasoning (8 marks)

At-risk group	Explanation
The elderly	Co-morbid disease – esp CV, renal. More likely on scary meds – esp diuretics, things that stop you vasodilating etc
The very young	SA:mass ratio; unable to get themselves out of heat – rely on others – e.g. baby in car
The poor/lonely	No air-conditioning/insulation, no transport to be able to get to cooler places
The crazy	May not modify behaviours to stay cool, lots of meds with impacts on cooling
The obese	
Chronic illness of any sort	

ii. What is the classic definition of heatstroke? (1 mark)

- Core temp > 40 C, CNS dysfunction & anhydrosis (the latter is often not present & is not an absolute diagnostic criterion)

iii. Provide 3 differential diagnoses of heatstroke in each of the 2 listed categories (6 marks)

Drug intoxication:

- anticholinergics, sympathomimetics (cocaine, anphetamines etc), salicylate/aspirin toxicity, serotonin syn, NMS

Infections:

- meningitis, encephalitis, brain abscess, systemic sepsis, malaria (cerebral)

iv. Complete the table listing 3 cooling methods and 2 advantages and 2 disadvantages of each (9 marks)

Cooling method	Advantages	Disadvantages
Evaporative	Simple, readily available, noninvasive, can access patient, relatively effective	Shivering, ideally need some equipment (fans, spray bottles), monitoring equipment can get wet
Immersion	Noninvasive, effective	Logistically difficult to perform, cumbersome, can't easily access patient, can't carry out monitoring, shivering
Ice packs/cooling blankets	Noninvasive, relatively effective, easy to perform, can be combined with other techniques	Shivering, discomfort – poorly tolerated, need ice
Lavage – gastric/peritoneal etc	Effective Rapid	Invasive Airway risk
Bypass	Rapid	Invasive

QUESTION 16 (11 marks)

A 10 year old boy collapses on the beach in Queensland after playing in a small rock pool. He had been handling a small sea creature. He is brought to your rural ED by paramedics who identified the creature as a blue ring octopus.

i. Identify the type of toxin and its mechanism of action (2 marks)

- Tetrodotoxin – Na channel blockade – causing neurotoxicity (similar to puffer fish toxin but more rapid onset)

ii. Describe the clinical features you would expect this child to exhibit in early and late stages of the toxidrome (4 marks)

- Rapidly progressing descending flaccid paralysis within minutes

Stage of toxidrome	Clinical signs
Early signs – list 2	Peri-oral paraesthesia Ptosis, blurred vision, diplopia, dysphagia
Late signs – list 2	Progressive descending flaccid paralysis Respiratory failure and respiratory arrest

iii. Identify the definitive management step for the toxidrome from the blue ring octopus (1 mark)

- Intubation and mechanical ventilation – paralysis usually resolves with 24hrs
- NO ANTIVENOM available

iv. List 2 other marine creatures which may cause collapse on an Australian beach and identify the mechanism of the collapse (4 marks)

Marine Creature	Mechanism of collapse
BOX JELLYFISH	Collapse and sudden death within minutes of the sting, from dysrhythmias and probable direct cardiac toxicity
SEA SNAKE	Venom has combination of post synaptic neurotoxins and myotoxins. Collapse is from symmetrical descending flaccid paralysis ie POST SYNAPTIC NEUROTOXIN

QUESTION 17 (17 marks)

A 10 year old girl is brought to the ED by her parents who noticed a rash on her chest. She is normally well and fully vaccinated although she has an intercurrent upper respiratory tract infection and cough. Her vital signs are normal except for a fever of 38.5^0C

A CLINICAL IMAGE IS SHOWN IN THE PROPS BOOKLET, PAGE 8

i. Describe the rash (1 mark)

- Sensible description

ii. List 5 possible causes of this presentation (5 marks)

Note this is petechiae with fever

- Meningococcaemia
- Viral infection – enterovirus, influenza
- Other bacteraemia – S pneu, H infl
- HSP
- ITP
- Leukaemia
- Illness causing fever with cough/vomit leading to head/neck petechiae

iii. Briefly describe 5 clinical developments that would raise your level of suspicion for a serious bacterial infection in this patient (5 marks)

- Impaired LOC/drowsiness etc
- Abnormal vitals – incr HR/RR, desaturation
- Poor perfusion
- Development of purpuric lesions
- Rapid/progressive spread of petechiae/purpure
- Others likely suitable

The patient's Full Blood Count results are displayed.

Component	Result	Normal Range
White Cell Count	16.1	4-11
Haemoglobin	110	115-175
Platelet Count	97	150-450
Haematocrit	0.30	0.36-0.56
MCV	79	79-96
MCH	28	27-32
MCHC	32	30-36
Neutrophil	2.1	2.9-7.9
Lymphocyte	9.8	1.8-4.0

iv. Given these blood results, list 2 possible differential diagnoses for the presentation. For each differential diagnosis outline clinical or investigation findings that would either support that diagnosis or make it less likely (6 marks)

- Acute leukaemia
  In favour – associated bone pain, lymphadenopathy, splenomegaly, hepatomegaly, blast cells on film, raised LDH, mediastinal widening on CXR, bone marrow aspirate

- Viral infection
  Can be assoc with thrombocytopaenia, can produce lymphadenopathy & hepatosplenomegaly. Produces atypical lymphocytes rather than blast cells

- ITP
  Should have isolated low platelets with other cell lines normal. In this case the high WCC could result from co-existent infection but the anaemia is not explained

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QUESTION 18 (21 marks)

You are the consultant of a regional base hospital. You are informed by local ambulance control of a level crossing train vs bus accident that has just occurred. It is estimated there are over thirty casualties of varying severity and that the first ambulances will start to arrive in the next fifteen minutes. Your shift NUM has never been involved in a major casualty incident before. She cannot find the local disaster plan and switch has no instant alert process.

i. List all the people/groups you would liaise with immediately (10 marks)

- Your Staff – nursing and medical
- Medical Superintendent
- Director of Nursing
- ED Director / NUM
- Retrieval Service alert
- Supporting Base Hospital ED
- Operating Theatres
- Blood Bank/Pathology
- Surgeon on call
- Anaesthetist on call
- ICU senior doctor/nurse
- Hospital Bed Manager
- Medical Staff Admin – JMO/ senior medical staff
- Radiology Dept / Radiologist on call
- Social Work
- Police for crowd control
- Senior Pathology doctor

ii. Other than the communication listed above, list 6 other processes to prepare your staff and the ED for the anticipated mass casualty event (6 marks)

- Brief staff with known information and assess disaster experience/ skill set
- Form teams for dealing with Red, Orange and Green card patients and remaining ED pts.
- Assign specific roles as staff arrive – eg radiology and surgical triage
- Clear ED of as many patients as possible – minors home, admits to the ward stat.

- Discern ideal patient flow pattern through the ED – allocate Red/Orange/Green areas.
- Brief Security / Police as to agreed patient flow pattern
- Hand overall Medical Command to Director Medical Services as soon as possible.
- Ascertain immediate staffing and other resource requirements – liaise with Medical Commander
- Ascertain change of shift staffing and other resource requirements – liaise with Medical Commander
- Ascertain staffing/logistical requirements for maintenance of core ED business – need for bypass
- Continual update from Ambulance Control

iii. Eight hours after the arrival of the first patients in your ED, the medical superintendent makes a decision to stand down the disaster response. List five processes you would undertake in achieving this outcome (5 marks)

- Clarify if this a total or partial stand down – if partial which parts of the ED response will continue eg green pt area for stragglers
- Re-institute normal ED function including decisions re staffing levels, which areas back on line first, re-establishing normal pt flow
- Defusing – immediate informal debrief with staff to ascertain feelings and thoughts about the episode – attempt identification of traumatised staff for ongoing management, seek feedback re process improvement
- Operational Debrief – within one week have sought further feedback from staff for presentation to hospital wide operational debrief with heads of other departments to analyse the organisational response
- Modification of ED disaster plan in response to Operational Debrief and internal analysis
- Counselling of staff ie identified as affected by disaster incident – in conjunction with medical admin and staff health