Candidate number _____

BOOK TWO
ANSWERS

Candidate number _____

QUESTION 10 (20 marks) – DOUBLE QUESTION

Many opportunities to provide preventative health interventions exist in the Emergency Department.

i. Briefly define "primary prevention" and "secondary prevention" (2 marks)

Primary prevention:

Secondary prevention:

- Primary prevention – *aims to prevent disease or injury before it occurs* by preventing exposure to hazards, altering unhealthy behaviours and increasing resistance to disease. Examples – seat-belt legislation
- Secondary prevention aims to reduce the impact of a disease already evident by *early detection/treatment.* Examples – breast cancer screening, daily aspirin in CAD

ii. List the 4 components of the CAGE questionnaire (4 marks)

- C – have you ever felt you should CUT down on your drinking?
- A – have people ANNOYED you by criticising your drinking?
- G – have you ever felt bad or GUILTY about your drinking?
- E – have you ever had a drink first thing in the morning to steady your nerves or get rid of a hangover (EYE opener)

iii. For each category below, list 3 indicators that a woman may be a victim of Domestic Violence (6 marks)

Physical Indicators

Behavioural indicators

Physical – Non-accidental Injury

- Unexplained bruising and other injuries
- Bruises of various ages
- Head, neck and facial injuries
- Injuries on parts of the body hidden from view (including breasts, abdomen and/or genitals), especially if pregnant
- 'Accidents' occurring during pregnancy
- Miscarriages and other pregnancy complications
- Injuries to bone or soft tissues
- Injuries sustained do not fit the history given
- Bite marks, unusual burns

Behavioural

- Multiple presentations often after hours
- Partner does most of the talking and insists on remaining with the patient
- Seeming anxious in the presence of the partner
- Evasive or ashamed about injuries
- Reluctance to follow advice

iv. In what circumstances should a report of Domestic Violence be made to Police irrespective of the victim's wishes (3 marks)

Where Domestic Violence poses a significant risk to an individual or the public, reports to Police must be made, even where this is against the wishes of the victim. Examples:

- Serious injuries have been inflicted e.g broken bones, stab/gunshot wounds
- The perpetrator has access to a weapon and has threatened any person or caused a reasonable person to fear for their personal safety
- An immediate risk to any individual/s or the public exists
- An offence has occurred on Health Service premises
- Health staff have been threatened

v. Other than alcohol and Domestic Violence screening, list 5 public health interventions currently carried out in Emergency Departments – provide an explanation or example for each (5 marks)

Public Health intervention type	Explanation/Example

- Secondary prevention – early detection of disease
- Injury surveillance – as part of research/Public Health Unit programs
- Disease outbreak surveillance – e.g. clusters of respiratory illnesses/flu detected
- Provision of immunisations – routine tetanus, rabies post-exposure
- Provision of preventative medications – "morning after pill", HIV & hepatitis PEP,
- Screening for tobacco and other drug use – "SBIRT"
- Promoting cigarette cessation
- Screening for elder/child violence
- Referral to support services – D&A, housing assistance, family violence support

Candidate number _____

QUESTION 11 (16 marks)

i. In the pre-hospital setting, list 3 advantages and 3 disadvantages of ultrasound in confirming pneumothorax (6 marks)

- Pros: Fast, no radiation, portable, accurate with training (high spec. + sensitivity), potentially avoids unnecessary intervention
- Cons: Requires training, ambient bright light may make interpretation difficult, patient access may be challenging, subcutaneous emphysema may cause artefact

ii. Write brief notes on the pros and cons of needle decompression vs finger thoracostomy (6 marks)

Needle decompression	Finger thoracostomy
Rapid, can be done whilst patient trapped	Need 360 degree access, not rapid
Temporising only, may be ineffective	Definitive
Landmark accuracy prone to error	Landmarks also prone to error but larger area of safety of insertion
Can cause iatrogenic vascular injury and bleeding	Can be associated with iatrogenic intercostal vessel/nerve injury and bleeding
Lower level of training required to perform	Requires training to perform
Patient doesn't require sedation for procedure	Patient requires at least LA and often some sedation for procedure

iii. List 4 clinical signs or symptoms of a tension pneumothorax (4 marks)

- Hypoxia, hypotension, agitation, dyspnoea, shock, ipsilateral dullness to percussion, ispilateral decreased air entry, contralateral hyper-expansion appearance
- Tracheal deviation not a reliable localising sign

Candidate number _____

QUESTION 12 (13 marks)

An 18 year old female presents to ED after an ingestion of 200 x 62.5mcg digoxin tablets. She has no past medical history of note and weighs 65kg.

i. What is the potential lethal dose of digoxin (1 mark)

- >10mg in adult or 4mg in child OR
- >10 times daily dose

ii. List the clinical features of ACUTE digoxin toxicity (3 marks)

- GI – nausea, vomiting, abdo pain
- CVS – bradycardia including heart block, slow AF, dysrhythmias including ectopic, bigeminy, SVT, VT, hypotension
- CNS – lethargy, confusion, delirium

iii. List 3 relevant investigations you would perform in this patient (3 marks)

- ECG
- UEC
- Digoxin level

iv. List the indications for the use of digoxin immune Fab (Digibind) (5 marks)

- Cardiac arrest
- Life threatening cardiac arrhythmias
- Ingestion of >10mg in an adult or >4mg in a child
- Serum digoxin level >15nmol/mL
- Serum K > 5mmol/L

v. What dose of digoxin immune Fab would be required for this patient (1 mark)

- Known dose – no. ampoules = ingested dose (mg) x 0.8 x 2 (based on one ampoule binding 0.5mg digoxin)
- OR 5 ampoules if HD stable, 10 if unstable
- Controversial with recent evidence suggesting minimal benefit

Candidate number _____

QUESTION 13 (11 marks)

A 56 year old man presents to the ED with priapism. He states he has had an erection without arousal for the past 7 hours.

i. What complications can occur if this condition is untreated [2 marks]

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- Erectile dysfunction
- Dysfiguration of penis

ii. Describe the role of cavernosal blood gas analysis in determining the cause of priapism (2 marks)

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- Gas analysis on cavernosal blood aspirated from the corpus cavernosum differentiates ischaemic from non-ischaemic forms of priapism. Ischaemic type needs urgent intervention. Typical pH cut-off is 7.25

iii. List 2 other investigations that might be indicated. Provide a brief justification for each (4 marks)

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- FBC/film - haematological causes - myeloma, sickle cell disease, leukaemia, thalassaemia
- Biochemistry – to seek causes like CKI/dialysis, gout, hyperlipidaemia, diabetes
- Malaria films
- Doppler ultrasound – as an alternative to gas analysis to differentiate ischaemic/non-ischaemic

iv. You are in a small hospital with no urological service. Outline your emergency department management of this condition [3 marks]

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- Ice blocks/local pressure
- Analgesia: perform penile block
- Aspirate up to 50mL blood from each corpus cavernosum via butterfly needle and syringe
- Injection with phenylephrine (1ml/1000mcg in 9ml normal saline), inject 0.5ml into corpus cavernosa and apply pressure
- Other sympathomimetic/alpha-agonist drugs acceptable – must be in a dilute solution
- Oral terbutaline 5-10mg
- Consult and transfer for urological care

Candidate number _____

QUESTION 14 (14 marks)

A 12 year old male presents after being kicked in the mouth whilst playing rugby at school.

i. Describe the injuries in the photo (3 marks)

A CLINICAL IMAGE IS SHOWN IN THE PROPS BOOKLET, PAGE 9

- Subluxed 1:1 (R upper 1st incisor)
- Extruded or Lateral luxation 2:1 (Lt upper 1st incisor)
- Lip contusion
- Alveolar Fracture

ii. Outline your stepwise approach to systemic analgesia in this child (3 marks)

Stepwise implies increasing strength / may allow for keeping NBM and skip oral agents
Drugs listed should include dose based on a weight estimation of about 35 kg

- Paracetamol 700mg (20mg/kg) or 525mg (15mg /kg)
- Ibuprofen 350mg (10mg/kg)
- IN Fentanyl 1.5-2mcg / kg (52.5-70mcg) Repeat after 5min
- IV Morphine 0.1mg/kg (3.5mg) repeated at 5min
- Ketamine IM/IV

iii. What are the goals of treatment for this dental injury (3 marks)

- Stabilise the teeth (prevent aspiration risk)
- Approximate anatomical position to prevent further ligament injury/aid healing
- Provide advice on definitive management with Dentist

- Exclude associated injuries
- Analgesia

iv. You decide to use IV ketamine for procedural sedation. What are the significant adverse effects of ketamine (3 marks)

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- Laryngospasm
- Emergence reactions
- Transient Apnea
- Emesis
- Allergy

v. The parents are not keen on ketamine. Describe your choice of regional anesthesia for this child (2 marks)

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_____

- Field block (Supraperiosteal) – 1% Lignocaine into mucobuccal fold above each tooth
- Bilateral Infraorbital nerve blocks

Candidate number _____

QUESTION 15 (13 marks)

A 40 year old man is brought to your ED after being swept into rough water whilst rock fishing in the middle of winter. On examination you notice a contusion to the right forehead.

Vital signs
GCS 5
HR 48 bpm
BP 105/70 mmHg
RR 12 bpm
SaO2 94% RA
Temp 28 deg C

i. List the key features on the ECG (2 marks)

A 12 LEAD ECG IS SHOWN IN THE PROPS BOOKLET, PAGE 10

- Sinus bradycardia, Osborne J waves, shivering artefact (SR, normal axis rate 40/m)

ii. List 5 important aspects to consider during the initial resuscitation (5 marks)

- A – and C spine protection/collar
- B – will need RSI/ intubation for airway protection with in-line immobilisation; and for CT head to be performed in safe/stable manner
- C – insert iv line and start giving warm iv fluids
- D – neuroprotection
- E – start rewarming with external measures; gentle handling of patient (esp if rhythm becomes AF, can precipitate VF otherwise)

iii. Describe the methods you would employ to rewarm this patient noting specific triggers for any invasive measures (6 marks)

- Rewarming
  - Remove wet clothing, dry patient (Passive Rewarming)
  - Peripheral Active Warming - Warm blankets, BAIR hugger, ?Radiant heater – (purported link to peripheral vasodilation, hypotension and core temp afterdrop not clinically important)
  - Consider Central Active Warming
    - warmed (40-46C) humidified inspired gases (1 C/h; 1.5°C/h ET tube)
    - warm IV fluids (42C) (only give if need fluids, prevents cooling rather than promotes warming) – use Level 1 fluid warmer
    - body cavity lavage with 40C fluid e.g. peritoneal (3C/h), gastric, bladder, right-sided thoracic lavage (3-6C/h – use 2 ICCs for continuous flow)
    - RRT
    - ECMO/ bypass (9-18C/h)

Candidate number _____

QUESTION 16 (16 marks)

An 18 month old immunised boy presents to ED with a 7 day history of a fever to > 39 degrees, poor oral intake and lethargy. On examination, he appears unwell with a blanching rash with some desquamation, a red tongue and bilateral conjunctivitis.

i. List 4 possible diagnoses starting with the most likely (4 marks)

- Kawasaki disease
- Scalded skin syndrome (Staph)
- Toxic shock syndrome (Strep), other streptococcal infection (e.g. scarlet fever)
- Steven's Johnson syndrome
- Measles, other viral exanthem
- Juvenile rheumatoid arthritis
- Drug reaction

ii. List the diagnostic criteria of the most likely diagnosis (5 marks)

- Fever for at least 5 days + 4/5 of the following:
- Bilateral (non-purulent) conjunctival injection
- Mucous membrane changes – reddened or dry cracked lips, strawberry tongue, diffuse redness of oral or pharyngeal mucosa
- Polymorphous rash
- Peripheral changes – palmar and plantar erythema, oedema, desquamation (usually in convalescence)
- Cervical lymphadenopathy (> 15 mm diameter, usually unilateral, single, non-purulent and painful)

iii. List 4 important investigations with a rationale for each (4 marks)

- Echo: Cardiac/ coronary artery imaging to determine or exclude dangerous complications of KD: coronary artery aneurysms, ectasia, mitral regurgitation, ventricular dysfunction, pericardial effusion, at least twice: at initial presentation and, if negative, again at 6 - 8 weeks
- Microbiological assays: Blood cultures +/- urine culture, exclusion of serious bacterial illness or secondary infection
- Strep A testing (serology /ASOT or Anti DNAase +/- throat swab), exclude invasive /recent Strep infection
- Measles testing (serology, urine/NPA PCR) to help exclude measles
- FBC /Platelet count/WCC, look for mild normochromic, normocytic anaemia and/or thrombocytosis (marked thrombocytosis common in second week of illness)
- Inflammatory markers (CRP/ESR), raised, non-specific, useful for severity assessment/disease monitoring/response
- LFTs - hypoalbuminaemia and elevated liver enzymes
- ECG - long PR and QT interval and T wave changes

iv. List 3 possible drug therapies for the most likely condition (3 marks)

- IV immunoglobulin 2 g/kg over 10 hours; preferably within the first 10 days of the illness but should also be given to patients diagnosed after 10 days of illness if there is evidence of ongoing inflammation - eg fever, raised ESR/CRP)
- Aspirin 3 - 5 mg/kg once a day for at least 6 to 8 weeks.
- Some give a higher dose (10mg/kg 8 hourly for the first few days) but this may not add nothing over immunoglobulin. (current conjecture between high and low dose)
- Corticosteroids (it's a possible Rx option, whose benefit is subject to evolving evidence)
- Others acceptable: paracetamol, intravenous hydration, anticoagulation for giant or multiple coronary aneurysms, fibrinolytics for coronary artery thrombus, influenza vaccine to prevent Reye Syndrome in children on long-term aspirin.

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QUESTION 17 (13 marks)

A young man has fallen onto his left hand, which is swollen and generally tender. Neurovascular status is intact.

i. Interpret the Xray (3 marks)

AN XRAY IS SHOWN IN THE PROPS BOOKLET, PAGE 11

- Perilunate dislocation
- Scaphoid fracture
- Appears closed injury, no SC air
- No immobilisation

ii. Outline 4 priorities in management (4 marks)

- Analgesia – appropriate
- Elevate, immobilisation
- Early ortho involvement – likely ORIF
- NBM

iii. List 3 long term sequelae (3 marks)

- Reduction in hand function/stiffness/OA
- Chronic pain

iv. The orthopaedic registrar requests your RMO to complete the consent for ORIF. Outline your response (3 marks)

_____

_____

_____

- Sensible response, counselling, collegiate etc

Candidate number _____

QUESTION 18 (16 marks)

A normally well 24 year old man is brought to your ED with increasing confusion and a seizure. A blood gas shows the following.

pH	7.31		
PCO2	51	mmHg	(35-45)
HCO3	22	mmol/L	(22-28)
Na	109	mmol/L	(135-145)
K	4.1	mmol/L	(3.5-4.2)
Cl	91	mmol/L	(95-110)
Glucose	10	mmol/L	(3.9-5.8)

i. Detail the specific emergency treatment required and provide treatment aims/endpoints (3 marks)

- Hypertonic saline
- 3mls/kg of 3% - or sensible dose
- Over 30 mins - or sensible rate
- Clinical improvement - cessation of seizures and clinical recovery
- Raising serum Na and serum osmols by 2-3mmol/L

ii. List 3 risk factors for the development of Osmotic Demyelination Syndrome (ODS) and write brief explanatory notes (6 marks)

- Serum sodium at presentation – most cases of ODS occur when initial [Na] < 105, and unusual for ODS to occur if initial Na > 120 mmol/L
- Duration of hyponatraemia – ODS rarely occurs if hypoNa has developed over only a few hours or up to a day (e.g. following ingestion of large volumes of water)
- Overly rapid correction – the increase over 24 or 48 hours appears more important than the hour-by-hour change. Safe 24 hour rise generally said to be about 5 mmol/L per day
- Other risk factors – especially groups who can develop ODS with less severe hypoNa and slower rates of correction
    - Alcoholism
    - Malnutrition
    - Liver disease
    - Hypokalaemia

iii. Hypertonic saline is also used in the management of raised intracranial pressure in traumatic brain injury (TBI). What dose/regime would you use and what target endpoints would guide your therapy (4 marks)

- Hypertonic saline 3% 150 mL bolus IV or 7.5% 75 mL bolus IV. Can repeat q 2-4 hours
- Targets/endpoints
    - ICP < 20 mmHg
    - Osmolality 300-320 mOsm/L
    - Sodium 145-150 mmol/L

iv. Briefly outline the advantages/disadvantages of hypertonic saline versus mannitol in TBI (3 marks)

- No good quality evidence of improved neuro or mortality outcomes for either drug
- HTS more effective in lowering ICP (failure rate of 16% for HTS vs 35% for mannitol)
- HTS has a more prolonged effect on ICP
- HTS "haemodynamically stable" compared to mannitol which causes osmotic diuresis → hypotension