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BOOK THREE

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QUESTION 19 (20 marks) – DOUBLE QUESTION

A 12 month old Asian boy is brought to the ED by his parents. Over the last 48 hours his mother noticed him becoming increasingly pale and lethargic and noted his urine was dark. He was seen by his GP 4 days ago with fever, vomiting and cloudy urine which settled with a course of trimethoprim. He is haemodynamically stable and apyrexial.

i. List 4 possible causes of this presentation (4 marks)

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- Haemolytic uraemic syndrome
- Haemolytic anaemia – only one mark for haemoglobinopathies
- Infection with dehydration
- Hepatitis / Cholecystitis / porphyria / dengue / malaria / intussusception

He has the following blood results:

WCC	11.8 x10^9/L	(3.6-11)
Neutrophils	7.3 x 10^9/L	(1.8-7.5)
Hb	60g/L	(115-165)
Hct	0.29L/L	(0.37-0.44)
Plt	500 x 10^9/L	(140-400)
RCC	3.5 x 10^{12}/L	(3.8-5.8)
MCV	90 fL	(80-96)
MCHC	320g/L	(285-300)
Reticulocyte count	240x10^9/L	(30-140)

DAT / Coombs test – negative
EUC – normal

ii. Describe and interpret the above results (2 marks)

- Normocytic, normochromic severe anaemia, associated reticulocytosis. Coombs negative (non immune mediated)
- Suggestive haemolytic anaemia

iii. List 4 other investigations to help confirm the likely diagnosis and provide your reasoning (8 marks)

- Bilirubin – increased indirect
- Haptoglobins- decreased
- LDH – elevated
- Coags
- U/A and micro – casts = renal, haematuria, urinary haemosiderin (severe haemolysis)
- Blood film – polychromasia – increased RBC production, bite cells – splenic removal hb, Heinz bodies, rule out malaria
- G6PD level – should be taken during well stages so no mark for this

iv. You suspect he has G6PD. List 4 causes of this condition (4 marks)

- Drugs – antimalarials, sulphonamides, cipro, aspirin (one mark only)
- Infections – multiple – (one mark only)
- Napthalene blue (moth balls)
- Fava beans
- Ketoacidosis

v. What would be your treatment for this patient (2 marks)

- Cease trimethoprim
- Admission paediatrics
- Supportive – IV fluids (reduce ketoacidosis / oxidative stress)
- Oral folate
- Does not require blood transfusion – no mark for suggesting this

QUESTION 20 (14 marks)

A 41 year old man presents with a brief syncopal episode. He has no significant past medical history, medications or allergies. On examination he is alert and cardio-respiratory exam is normal.

Vital signs	HR	96 bpm
	BP	135/80 mmHg
	RR	12 bpm
	SaO2 RA	96%
	Temp	36.5 deg C
	BSL	5 mmol/L

i. Describe the most significant finding on this ECG and state the most concerning diagnosis given the clinical setting (2 marks)

A 12 LEAD ECG IS SHOWN IN THE PROPS BOOKLET, PAGE 9

- Brugada Syndrome
- ST elevation >/=2mm followed by negative T wave in V1-2 or coved ST elevation >2mm in V1-2; in association with syncope, this is diagnostic of Brugada syndrome

ii. List 4 differential diagnoses for this ECG pattern (4 marks)

- Atypical RBBB
- Myocardial ischaemia/infarction
- Benign Early Repolarisation
- PE
- Myo/pericarditis
- Athletes
- Pectus excavatum
- RV outflow obstruction or other RV abnormality

iii. List 4 relevant questions you would ask the patient (4 marks)

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- Family history of sudden cardiac death < 45 years of age
- Triggers such as any fever? Drugs? eg Na ch blocker, CCB, BB, nitrates, alpha agonist, cocaine, alcohol
- Exertion related
- Nocturnal agonal respirations
- Others

iv. Outline the important components of his disposition, follow-up and ongoing management (4 marks)

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- Admit for monitoring – explain concern for serious dysrhythmia
- Cardiology referral and regular follow up will be required; consideration for ICD
- Family screening is strongly recommended in first-degree relatives (autosomal dominant inherited disease); genetic counselling/testing if available (but low diagnostic yield)
- Avoid drugs/triggers eg as mentioned above

QUESTION 21 (19 marks)

A 30 year old man presents to your ED with a 24 hour history of increasing weakness.

An ABG and electrolytes are performed.

ABG

FiO2	21%	
pH	7.26 mmHg	(7.35-7.45)
pCO2	29 mmHg	(35-48)
pO2	101 mmHg	(83-108)
HCO3	13 mmol/L	(21-28)
BE	-13 mmol/L	(-1.5-3.0)

ELECTROLYTES

Na	137 mmol/L	(136-146)
K	1.8 mmol/L	(3.9-5.2)
CL	116 mmol/L	(95-110)
Urea	7.8 mmol/L	(3.1-8.1)
Creat	86 mmol/L	(60-110)
Glc	4.0 mmol/L	(3.9-5.8)
CK	1975 U/L	(29-168)
Trop T	20 ng/L	(<30)

i. Describe and interpret his blood results (8 marks)

- **NAGMA**
  - AG = Na – (Cl + HCO3) = 137 – (116 + 13) = 8
  - Causes of NAGMA include pancreato/uretero-enterostomies, small bowel fistulae, excess chloride, diarrhoea, carbonic anhydrase inhibitors, RTA, Addison's.
- **Appropriate respiratory compensation**
  - Expected CO2 = 1.5 x bicarb + 8 = 28
- **Severe hypokalaemia** likely cause of weakness - ? secondary to chronic diarrhoea, may be hereditary
- **Mild elevation in CK** – likely just dehydration, could be due to: infection, hypokalaemia, metabolic (thyroid storm, phaechromocytoma). Not severe rhabdomyolysis

ii. List your 3 immediate management priorities (3 marks)

- Move to monitored bed. Need for ECG
- Needs potassium replacement in monitored environment, likely to need central line for IV potassium replacement. Need to contact HDU
- Need for IVF as likely element of pre-renal failure in view of mild CK rise

iii. An internal jugular central venous catheter is placed to facilitate potassium replacement. List 4 early and 4 late complications of internal jugular central venous catheter placement (8 marks)

Immediate/Early

- pneumothorax
- failure to locate vein
- accidental arterial puncture
- haemothorax
- haematoma
- arrhythmia
- thoracic duct injury
- guide wire embolus
- air embolus
- haemopericardium and tamponade
- pneumothorax
- catheter blockage
- chylothorax
- catheter knots

Late

- infection (no difference in the rate of catheter-related bloodstream infections between the IJ, SC and Femoral sites -> 2.5 infections/ 1000 catheter days)
- catheter fracture
- vascular erosion
- vessel stenosis
- thrombosis
- osteomyelitis of clavicle

QUESTION 22 (13 marks)

This 23 year old man sustained isolated dental trauma in a fall.

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

i. Briefly describe two methods of anaesthetising the affected teeth (4 marks)

- Local infiltration = supraperiosteal infiltration. 2mL of lignocaine injected approx 2mm deep into the deepest part of sulcus formed by reflection of the buccal & gingival mucosa directly opposite affected tooth.
- Infra-orbital nerve block. Palpate infraorbital notch, slide finger just below orbital rim. Infiltrate 2mL of lignocaine at that site. Could also use the intra-oral approach through mucosal sulcus up to foramen
- Anterior superior alveolar nerve block. Use intra-oral approach like for infra-orbital n block

ii. Describe the injury to the upper left lateral incisor (tooth 22) (2 marks)

- Extrusive luxation (partially extruded from socket), displaced posteriorly – also has an uncomplicated crown fracture with dentine visible (no pulp) [Ellis Class II]

iii. Assuming a 12 hour delay to see a dentist, outline the Emergency Department treatment of this tooth injury (4 marks)

- Ideally need OPG to assess fracture of alveolar bone
- Local anaesthetic (see above), analgesia
- Reinsert tooth into normal position (mould alveolar bone if needed, check occlusion)
- Splint to adjacent teeth with Glass Ionomer Cement (GIC). If no GIC available need alternate splint – e.g. "blue tac" and a mouth guard
- Cover exposed fracture surface (dentine) with GIC
- If no GIC available needs relatively urgent (< 24h) f/u with dentist
- Will need splinting for 2-4 weeks

iv. List 3 possible adverse dental sequelae of this tooth injury (3 marks)

- Pulpitis/Dental abscess
- Pulp necrosis
- Ankylosis
- Root resorption
- Need for root canal therapy
- Tooth colour change

QUESTION 23 (15 marks)

A 7 year old boy presents to your ED with an injury to his right elbow after a fall. The elbow is obviously deformed and swollen.

i. What are the immediate issues that need to be addressed (3 marks)

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- Analgesia
- Is there neuro/vascular compromise? Time-frame to reduction?
- Splint / sling
- History, consider mechanism, consider NAI??

ii. Describe the X-ray findings (3 marks)

AN XRAY IS SHOWN IN THE PROPS BOOKLET, PAGE 11

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- Obvious dislocation of the elbow posteriorly and laterally
- On lateral view there is a small bony fragment above the epiphysis.
- Applying CRITOE you can deduce that there is a displaced fracture of the medial epicondyle (which should be ossified at 5 years). It is not the olecranon. AP view shows medial epicondyle 'missing'

iii. List 4 potential implications of this injury (4 marks)

- Neurovascular compromise. If present will need immediate reduction
- Difficulty in relocation in view of displaced medial epicondyle. Will need specialist input and likely OT regardless of ED management. Need for expert assistance – OT reduction preferable
- Long term issues – malunion, non-union, poor function, neurovascular impairment

iv. Describe the course of the ulnar nerve at the elbow (2 marks) and list the forearm and hand muscles potentially affected by ulnar nerve injury (3 marks)

- Arises from brachial plexus, descends down medial side of upper arm, passes posterior to medial epicondyle to enter forearm, pierces the two heads of FCU then descends alongside the ulna
- FCU and medial half of FDP, interossei, medial two lumbricals. Wrist flexion can occur but accompanied by abduction, impaired adduction at wrist, abnormal finger add/abduction

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QUESTION 24 (17 marks)

A 70 year old man presents with a painful facial rash that started 5 days ago. There have been no new skin lesions for 24 hrs. Vital signs are normal but he is distressed with pain.

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

i. Describe the appearances seen in this photograph (3 marks)

- Erythema in right forehead CNV1/unilat forehead distribution/dermatomal
- Crusting and scab to the same distribution
- Right eye closed ? ptosis
- Fluorescein staining to right eyelids

ii. List the most likely diagnosis (1 mark)

- Herpes Zoster

iii. List 4 complications of this condition. For each of these, list one examination finding that would support the existence of the complication (8 marks)

- Ocular ulceration/keratitis (zoster ophthalmicus)
  - Slit lamp evidence of ulceration/VA
- Transverse Myelitis
  - Neurological findings in limbs
- Bells Palsy
  - Facial weakness inc forehead
- Deafness
  - Hearing tests/tuning fork tests
- Bacterial superinfection
  - Heat/redness/purulent
- Cerebrovasc events
  - Neurological abnormalities
- Aseptic Meningitis
  - Meningism/photophobia
- Ramsay-Hunt
  - Vesicles in ears

iv. Outline your management for this patient (5 marks)

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- Ocular protection – eye taping (not padding as pressure effects)
- Ocular lubrication – chlorsig drops or ointment 4-5/day/ or lubricant drops
- Analgesia – Panadol/Nurofen/Opiates (with doses), consider early amitryptiline if ongoing pain (?PHN) – amitryptiline 25mg nocte
- Antivirals - Too late for aciclovor/famciclovir for skin as >72 hrs and no new lesions – however if eye involved can use
  - Aciclovir 800 mg orally 5 times a day for one week, or
  - Famciclovir 250 mg orally 8 hourly for one week, or
  - Valaciclovir 1 g orally 8 hourly for one week
  - May supplement with topical acyclovir
  - IV aciclovir if sight threatened
- Ophthalmology involvement

QUESTION 25 (12 marks)

A 53 year old female had a syncopal episode and collapsed onto an electric heater. She sustained a facial burn. She is now haemodynamically stable and GCS 15.

You are in a rural ED.

A CLINICAL IMAGE IS SHOWN IN THE PROPS BOOKLET, PAGE 13

i. List 4 issues to consider in your assessment of this patient (4 marks)

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- Cardiac monitoring/ECG/other investigations for **cause of syncope**
- Assess for **airway involvement**
- Assess for signs of head/neck/ other injury – e.g. fluctuant/altered GCS, lacerations, haematoma, haemotympanum
- Tetanus status?
- Other

ii. How would you describe this burn to the burns registrar on call at the tertiary hospital (2 marks)

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- Burn involves approx. 2% TBSA
- Central area of full thickness burn (approx. 1% TBSA) with white/leathery appearance of skin and no capillary refill
- Surrounded by partial thickness burn with evidence of deroofed blisters
- Area extends from the patients left ear (involving the inferior 2 thirds of their helix, antihelix and the tragus), the majority of the patients left maxillary, mandibular and zygomatic areas, to the patient's chin.
- Left eye, lips and airway appear to be spared

iii. Outline 4 issues in the management of this burn (4 marks)

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- Administer first aid if not already received – cool running water for 20mins
- Tetanus booster
- Appropriate analgesia
- Apply appropriate dressing (ie Silver-based eg acticoat) or bactigras
- Refer to a burns centre as this is a full thickness facial burn that will require a skin graft – needs tertiary management

iv. List 2 possible adverse sequelae from this burn (2 marks)

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- Infection (left ear particularly at risk given it is a cartilaginous structure)
- Involvement of facial nerve, resulting in facial droop on the left side
- Permanent scarring
- Others

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QUESTION 26 (16 marks)

A 6 year old girl is brought to the emergency department by her mother. She has had a cold for 1 week, and for the last 24 hours her right eyelid has become very red and swollen. She is unable to open her eye. Her temperature is 38.4 degrees Celsius.

i. In the table below list 4 examination findings for each condition that may differentiate pre-septal from post-septal cellulitis (8 marks)

Pre-septal	Post-septal
Normal visual acuity	Reduced visual acuity/colour vision/diplopia Gross proptosis
Mild upper lid oedema/erythema	Ophthalmoplegia Reduced light reflex or swinging light test
Normal eye examination	Headache/vomiting CNS signs/symptoms Bilateral peri orbital oedema (cavernous sinus thrombosis)
No ophthalmoplegia	Systemically unwell Drowsy/lethargy/fever/Irritable

ii. List 2 bacteria that can cause this presentation (2 marks)

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- Staph aureus
- Haemophilus Influenzae type B (unvaccinated)
- Strep species
- Anaerobic bacteria in post septal

iii. List appropriate antibiotic therapy (include route and dose) for pre-septal and post-septal cellulitis (2 marks)

	Antibiotic (Dose and Route)
Pre-septal cellulitis	PO Flucloxacillin 12.5mg/kg up to 500mg qid PO Cephalexin 12.5mg/kg up uto 500mg qid PO Clindamycin 10mg/kg up to 450mg tds PO Augmentin or PO Cefuroxime (if Hib suspected)
Post-septal cellulitis	IV Cefotaxime 50mg/kg up to 2g q 8 hrly OR IV Ceftriaxone 50mg/kg up to 2g daily, AND IV Flucloxacillin 50mg/kg up to 2g q 6hrly

iv. List 4 complications of peri-orbital cellulitis (4 marks)

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- Orbital cellulitis
- Cavernous sinus thrombosis
- Osteomyelitis
- Sepsis
- Abscess

QUESTION 27 (19 marks)

A 30 year old 90kg lady presents to your emergency department having taken a poly-pharmacy overdose including panadeine forte, carbamazepine and temazepam. You are considering treating her with activated charcoal (AC).

i. What dose would you use if you decided to administer AC (1 mark)

- 50g (1g/kg in a paediatric patent)

ii. List 5 general contraindications for this therapy (5 marks)

- Patient requiring active resuscitation
- OD > 1hr ago (controversial)
- OD of non binding agent – (Metals/Hydrocarbon/Alcohols/Acids/Alkalis)
- Aspiration risk - potential for seizures or decreasing LOC
- Benign agent
- Sub-toxic dose
- Corrosive agent

After a short period, she becomes drowsy, tachycardic (120 bpm) and hypotensive (85/43 mmHg). Further history reveals that she has taken up to 9g of carbamazepine.

iii. List 4 investigations that should be performed in this patient (4 marks)

- **ECG**
- **BSL**
- **Paracetamol level**
- HCG
- Carbamazepine level

iv. List 5 clinical features you would expect from a significant carbamazepine overdose (5 marks)

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- CNS - decreased LOC/seizures/ataxia/nystagmus
- CVS - hypotension/tachy-or-brady-arrhythmias, prolonged PR/QRS/QT, pulmonary oedema
- Anti-cholinergic effects - retention/tachycardia/delirium etc

v. During your management, the patient has a generalized tonic-clonic seizure. List 4 conditions that should be excluded (4 marks)

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- Hypoglycaemia
- Hyponatraemia
- Intracranial pathology
- Pregnancy with eclampsia
- Co-ingestant
- Acute withdrawal