

South East Queensland Fellowship Written Mock Exam

2019.2

3rd October 2019

Book Three

SAQ 19 to 27

With thanks to the FACEMs and the Emergency departments of

Sunshine Coast University Hospital

Caboolture Hospital

Redcliffe Hospital

The Prince Charles Hospital

Royal Brisbane & Women's Hospital

SAQ 19

Long question 18 Marks

You are in charge at the emergency department of a tertiary centre when the ambulance service notifies you of the imminent arrival of a 28yr old female who is 30 weeks pregnant who has been involved in a motor vehicle collision.

You are informed that her vital signs are:

GCS 15 (E4,V5,M6)

HR 120

BP 100/80

O2 sats 95% RA

RR 24

Temp 37.

BSL 5.6.

You prepare for her arrival with your trauma team.

1. Complete the table, listing 3 changes to her cardiovascular and 3 changes to her respiratory system in pregnancy and their implication that make interpretation of her vital signs or management challenging (6 marks)

Cardiovascular	Change in pregnancy	Implication
Plasma volume	Increased by 50%	Dilutional anaemia, reduced O2 carrying capacity, signs of shock appear late
Heart rate	Inc 15-20bpm	Inc CPR demands
Uterine blood flow	10% CO	Potential for massive haemorrhage
Respiratory	Change in pregnancy	Implication
RR	Inc	Dec buffering capacity, acidosis more likely
Laryngeal oedema	Inc	Difficult intubation
Upper airway blood supply	Inc	Friable mucosa- inc bleeding and difficult airway visualisation

2. List the relevant specific maternal obstetric history to obtain: (4 marks)

Confirm gestation in weeks and current pregnancy complications
Fetal lie/ placental location
Blood type/Rh status
Previous pregnancy/birth complications

On your primary survey you confirm her vital signs are

HR 120
 BP 100/80
 RR 24
 O2 sats 95%
 Afebrile
 GCS 15.

She has equal breath sounds, no evidence of a chest injury and her airway is patent with no cervical tenderness. She is warm and well perfused with dual heart sounds. She has a seatbelt mark across her abdomen with tenderness in the left upper quadrant.

3. List 3 diagnostic imaging options of her abdomen and their justification for use: (3 marks)

Imaging modality	Justification
FAST scan	Similar sensitivity in non-pregnant patient, will identify free fluid in the abdomen
Formal USS	Confirm gestational age, solid organ injury, FHR, fetal activity/presentation, placental locations, amniotic fluid volume
CT abdo	Risk of radiation is small compared to delayed diagnosis of trauma, fetal vulnerability most <15 weeks gestation, will define injury and grading

4. She is known to be Rh negative. What is the role for a Kleihauer test? (1 mark)

To confirm the dose of Anti-D required post sensitising event. i.e if she needs more than 625IU (if kleihauer >6ml will need inc dose anti-D)

5. List 4 clinical examination findings you expect if placental abruption occurs: (4 marks)

Abdominal tenderness

Vaginal bleeding

Uterine tenderness/woody feel

Uterine contractions

Also: fetal compromise and maternal haemodynamic instability

SAQ 20

12 Marks

A 55yo woman presents to the emergency department complaining of headache and visual abnormalities.

1. List three causes of headache that may be associated with visual symptoms. (3 marks)

- **Migraine**
- **Giant cell arteritis**
- **Acute closed angle glaucoma**
- **Cavernous sinus thrombosis**
- Space occupying lesion
- Stroke

2. For each of your differentials listed above, provide a differentiating feature, an investigation, and a treatment. (9 marks) (JT - any three diagnoses, they don't need to have all these!)

Cause	Differentiating features	Investigations	Treatment
Migraine	History of migraines Classical visual aura Unilateral headache	1 st episode: CT (brain) +/- LP	Simple analgesia Tryptans Lots

Giant Cell Arteritis	Temporal tenderness Jaw claudication Elderly patient Papilloedema Decreased visual acuity Decreased temporal pulse Diplopia	ESR >50 Temporal artery biopsy	Steroids
Glaucoma	Acute severe pain with red eye, orbital or unilateral head pain Blurred vision Haloes	Raised Intraocular pressure (>20mmHg)	Pilocarpine Timolol Acetazolamide Analgesia antiemetic
Venous sinus thrombosis	Persistent, not severe Chemosis Proptosis	CT (venogram) MR (venogram)	Anticoagulation Maintain CPP
Space Occupying Lesion	Morning headaches B symptoms	CT (brain) - contrast	Chemoradiotherapy Surgery

SAQ 21

12 Marks

A 32-year-old man is brought by ambulance to your ED after failing to complete an ultra-marathon race. It is the middle of summer, and he has been running for most of the day, but collapsed during the race. He is confused and drowsy.

His observations are:

GCS 12: E3V4M5
Temp: 41 °C
HR: 140 bpm, sinus rhythm
BP: 95/45
RR: 30 breaths/min
Sats 95% on room air

1. Complete the following table by listing 3 differential diagnoses for his presentation. For each diagnosis, list 2 examination findings you would search for that would support that diagnosis. (6 marks)

Differential Diagnosis	Examination finding	
Heat stroke	Hot, dry skin	Evidence of complications: APO (pulmonary crackles) DIC (bleeding from wounds/IVC sites) rhabdo (muscle tenderness, dark urine)
Sepsis (meningoencephalitis)	Meningism	Obvious infective focus: e.g. skin infection/focal lung creps/focal abdominal tenderness
Drugs (serotonin syndrome, amphetamines)	Hyperreflexia/clonus	Diaphoresis Tremor Delirium
Thyroid storm	Signs of thyroid disease (goiter, exophthalmos, myxoedema)	Tremor Tachycardia out of proportion to fever Warm, moist skin (diaphoresis)

2. List 3 methods of cooling, and for each method list one advantage and one disadvantage. (6 marks)

Cooling Method	Advantages	Disadvantages	Recommendations
Evaporative cooling	Provides effective cooling	Can cause shivering	Strongly recommended
	Readily available	Less effective in humid environments	
	Practical	Makes it difficult to maintain electrode positions	
	Well tolerated		
Immersion cooling	Provides effective cooling	Can cause shivering	Recommended
		Poorly tolerated	
		Not compatible with resuscitation settings	
Ice packs on neck, axillae, and groin	Practical	Cooling times longer than other modalities	Can be used as adjunct cooling method
	Can be added to other cooling methods	Poorly tolerated	
Cardiopulmonary bypass	Provides fast and effective cooling	Invasive	Recommended in severe or resistant cases when available
		Not readily available	
		Setup is labor intensive	
Cooling blankets	Easy to apply	Have limited cooling efficacy	Not recommended when other methods available
		Impede use of other cooling methods	
Cold water gastric, urinary bladder, rectal, or peritoneal lavage	—	Invasive	Effectiveness and safety not established
		Labor intensive	
		May lead to water intoxication	
		Human experience is limited	

SAQ 22

12 Marks

A 25 year old female has been brought to your department by ambulance and police escort. She is agitated and violent, with contusions over her face and head.

The handover indicates her neighbours called the police for a domestic disturbance. Ambulance and police found evidence of drug paraphernalia around the house as well, as multiple empty alcohol containers. Medications in the patient's name include thyroxine, venlafaxine and pregabalin.

1. Other than alcohol/drug intoxication and psychosis, list 4 likely causes for this patient's presentation (4 Marks)

1. Trauma (head injury)
2. Non-intoxication toxidrome (serotonin toxicity)
3. Metabolic disturbance (thyroid storm, hypertensive encephalopathy)
4. Infective (meningo-encephalitis, febrile delirium)
5. Hypoxia
6. Drug withdrawal
7. Post ictal state

2. List 4 potential complications of emergency sedation (4 Marks)

1. Depression of airway reflexes
2. Depression of ventilation
3. Depression of cardiovascular system
4. Drug interactions/reactions (anaphylaxis, acute dystonic reaction, oculogyric crisis)

3. List 4 departmental design features that can help mitigate negative psychosocial states and violence in Emergency Departments (2 Marks)

1. Well lit + minimize hiding spaces
2. Positive distractions in waiting area (TV, play area for children, art works)
3. Clear sign posting + way-finding
4. Visible waiting area/CCTV
5. Duress alarms
6. Controlled/swipe card access to clinical areas
7. Separate access + non clinical/break areas for staff
8. Behavioural assessment rooms/safe assessment spaces

4. List 4 system-wide approaches to mitigation of violence in Emergency Departments in general (2 Marks)

1. Adequate staffing models
2. Hospital security
3. Staff training (de-escalation, violence recognition and prevention, reporting)
4. Violence response policy (Code Black/security response/police response)
5. Standardised reporting system/risk management
6. Supporting staff taking legal action

SAQ 23

12 Marks

A 77yr old man presents 7 days after being discharged following a total colectomy for a newly diagnosed obstructing bowel cancer. He describes non-specific symptoms of malaise, lethargy and nausea.

His blood results are;

Na	127	(135-145 mmol/L)
K	6.1	(3.5 – 5.2 mmol/L)
Ur	37.1	(2.9 – 8.2 mmol/L)
Cr	700	(64 – 108 mmol/L)
eGFR	6	(>60 mL/min)
HCO ₃	12	(22-32 mmol/L)
Cl	95	(95-110 mmol/L)

1. State THREE abnormalities, including any equations used, on these blood results (3 marks)

1. High Anion Gap Metabolic Acidosis ($127 - 95 - 12 = 20$)

2. Renal failure - intrinsic or post renal (Ur:Cr ratio = 53 or <100)

3. Either mild or moderate hyponatraemia OR moderate to severe hyperkalaemia

No marks for metabolic acidosis with mention of AG or for renal failure without mention of ratio

2. List FOUR potential causes for this gentleman's presentation and blood results (4 marks)

Pre-renal

- Hypovolaemia
 - Poor oral intake
 - Post operative bleeding
 - 3rd space losses
 - Malabsorption
 - High output stoma
- Sepsis
 - Intra-abdominal or post operative collection
 - One other cause of infection (e.g. UTI, pneumonia etc)

Renal

- *Nephrotoxic drugs*

Post-renal

- Damage to ureters intra-operatively
- *Urinary retention*

3. List FIVE investigations you might perform. Include a clinical indication for each investigation. (5 marks)

*list not comprehensive, other investigations could be correct if deemed appropriate and reasonable justification

Investigation	Justification
VBG	Define degree of acidosis Measure lactate as a surrogate marker of tissue hypoperfusion
ECG	Investigate for hyperkalaemia
Bladder Scan	To investigate for urinary retention
Urine MCS	Assess for UTI as cause for sepsis
Urine Na/Osmolality/Cr	Help distinguish pre-renal vs renal/obstructive causes
FBC	Hb - anaemia due to volume loss or indication of CKD WCC - marker for infection
Blood cultures	Assess for infectious organism and targeted antibiotic therapy
CXR	Assess for fluid overload
Renal Ultrasound	Assess for hydronephrosis
CT Abdomen (non-contrast)	Investigate for collection or intra-operative complications

SAQ 24

12 Marks [Pass Mark 8/12](#)

A 13 year old boy with severe cerebral palsy (wheelchair for all mobility, non verbal, unable to use head or trunk against gravity), presents with parents who are concerned about worsening respiratory distress. They are specifically concerned about aspiration. His weight is 31 kg.

His vital signs are

GCC	7 E 4 V1 M2
Pulse	110beats/min
CRT	2seconds
BP	98/62mmHg
O2 sats	96% FiO2 0.21
Temp	36.4
BSL	4.2mmol/L

1. STATE 4 (four) features on history relevant to his background condition of Cerebral Palsy (4 Marks)

Communication – how does he communicate, how does he express pain and distress

Diet/Nutrition – PEG feeds, any oral diet

Presence of cerebral palsy co-morbidities – scoliosis, gastro-oesophageal reflux, seizures

Previous ICU admissions

Previous intubations

Advance Health Care Directive

Baseline respiratory status – cough, secretions, home oxygen, home suction

2. List 3 differences between Aspiration Pneumonitis and Aspiration Pneumonia (3 Marks)

Aspiration Pneumonitis	Aspiration Pneumonia
Acute chemical injury to lung parenchyma after aspiration of stomach contents	A bacterial infection caused by aspiration of organisms from oropharynx. Can follow aspiration pneumonitis
Rapid onset - hours	Delayed onset
Clinically ranges from mild (cough and wheeze) to severe (acute respiratory distress syndrome)	Clinically similar to standard pneumonia
Improves quickly	Trajectory as per pneumonia, dependent on patient, severity and correct treatment
No antibiotics	Give antibiotics

3. Interpret his VBG taken on arrival (2 marks)

pH 7.23
 pO₂ 238mmHg
 pCO₂ 48mmHg
 HCO₃ 21mEq/L

Respiratory acidosis
 Metabolic acidosis

4. His respiratory distress worsens and his saturation are now persistently 81% with FiO₂ 0.21. Discuss the rationale for three different ways of managing his hypoxia. (3 marks)

Non-invasive – low flow Hudson mask. Unable to maintain oxygen levels on room air, hypercapnia not worsening, shared decision with parents. Respiratory may be more severe however for ward based therapies only.

Non-invasive – high flow nasal prongs severe respiratory failure unable to maintain saturation of low flow oxygen. May remain on high flow if shared decision making with parents means not for more invasive support.

Intubation and Ventilation – severe respiratory failure, unable to maintain saturation on non-invasive methods, unable to protect airway due to ALOC or due to ongoing aspiration events, shared decision with parents

SAQ 25

12 Marks

A 65 year old man is brought to ED with a stroke. He is usually independent and well. He has treated hypertension and elevated lipids. He has right sided hemiplegia (worse on arm than leg), eyes deviated to the left, and global aphasia. You cannot assess sensation or visual fields due to the aphasia. He is awake.

Symptoms started 2hrs previously.

- 1) List risk factors for stroke (4 marks)

HTN
DM
Lipids
Male
Age
AF
Valvular disease
CCF, IHD

- 2) What is the likely cerebral territory involved? (2 marks)

Left MCA 1 mark
Proximal ie M1 1 mark

- 3) The decision is made to offer thrombolysis. What agent do you use? (2 marks)

tPA 0.9mg/kg to max 90mg. 10% bolus then 90% over 60mins
OR
tenecteplase 0.25mg/kg to max 25mg over 1 minute

Need to choose a drug and dose for two marks

- 4) Following CT imaging he is referred for interventional radiology. What are the indications for IR clot retrieval? (4 marks)

NIHSS ≥ 6
Pre-stroke Rankin score ≤ 1
Acute ischaemic stroke from occlusion of
-internal carotid
-M1
-dominant vertebral
-basilar
-M2 if NIHSS >10 and if ineligible for thrombolysis
thrombolysis able to be given within 4.5 hours after stroke onset
arterial access can occur within 24 hours of stroke onset

SAQ 26

12 Marks

A 27-year-old woman presents to your suburban emergency department following a seizure. This is a first seizure and is described as tonic-clonic. The seizure self-resolved after 5 minutes.

Observations:

HR	105bpm
SpO2	99% RA
BP	123/84
GCS	12 (E3 V4 M5)

1. List eight (8) causes for a first seizure.(4 marks)

- Epilepsy
- Toxicological:
 - Drug withdrawal (alcohol, benzodiazepines, barbiturates)
 - Drug intoxication (Sympathomimetic, antipsychotic, antidepressant, theophylline, isoniazid, opiates)
- Space occupying lesion
- Stroke
- Trauma
- Intracranial haemorrhage (SAH, intracerebral bleed)
- Hypoxic seizure
- Hypoglycaemia
- Electrolyte disorder
 - Hyper/hypo-natraemia
 - Hypercalcaemia
- CNS infection (meningo-encephalitis, cerebral abscess, neurocysticercosis)

The patient has recurrent seizures whilst in the department.

The junior medical officer has given a loading dose of phenytoin as an IV bolus.

2. Describe the possible adverse effects of an IV bolus dose of IV phenytoin, and management of these effects(4 marks)

- Effects:
 - Sodium channel blockade
 - QRS widening
 - Dysrhythmia inc. VT
- Management:
 - Sodium Bicarbonate 2mmol/kg IV every 1-2 minutes
 - Multiple doses often required
 - Lignocaine 1.5 mg/kg IV
 - When pH >7.5

3. List two (2) IV anticonvulsants and their doses, other than phenytoin, that may be used in status epilepticus.(4 marks)

- Levetiracetam
 - 20mg/kg IV
 - If post ictal then over 20 minutes.
 - If seizing, then slow push.
- Valproate
 - 20mg/kg IV
 - 10 minute infusion
- Phenobarbitone
 - 20mg/kg IV
 - Maximum rate of 60mg/min.
 - 20-30 minute infusion

SAQ 27

10 Marks

No answer yet

You are working in a regional hospital. Ambulance have arrived with a 23yr farmhand who has an isolated head injury after being kicked in the head by a horse. She had a seizure en route. You decide to intubate her.

1. In the table below outline 5 different measures to prevent secondary brain injury:

Principle: Specific intervention:

<i>Intervention</i>	<i>Therapeutic aim</i>

The following arterial blood gas is taken at 30mins post intubation.

Her corresponding end-tidal CO₂ is also listed below.

PaCO ₂ : 49mmHg PaO ₂ : 290mmHg EtCO ₂ : 36mmHg	Ventilator Settings: FiO ₂ 60% RR 16 TV 560 PEEP 16 PS 10
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2. List 2 likely causes for the possible discrepancy between her EtCO₂ and PaCO₂ readings and suggest 3 changes in her ventilation settings:

<i>Causes for her discrepancy in EtCO₂ and PaCO₂:</i>
<i>Changes to ventilation settings:</i>

End of the SAQ Paper

Well done