

1. Lead examiner

Candidate Number:

2. Co-examiner

Final Mark:

SCENARIO

A 25 year old male soldier is brought by ambulance to your emergency department. He was found collapsed at the top of a large hill while participating in military exercises. He has been administered only basic first aid. Initial findings:

- Decreased conscious state. Eyes open to voice, localising pain, mumbling a few words.
- Hot to touch, sweating profusely. Temperature (tympanic membrane) 41.5 degrees Celsius.
- HR 140/min
- BP 90/30 mmHg

Question 1: What is your differential diagnosis?

Expected Response	Comments	Mark
Differential Diagnosis	Critically unwell – haemodynamic compromise and severe hyperthermia. GCS is 11. Causes in combination are possible, or some the consequence of others. - Environmental: Heat Stroke; Heat Exhaustion (although poor GCS suggests the former) - Metabolic: Dehydration (initial findings make this likely), hypoglycaemia, thyroid storm - Infective: Serious bacterial illness, incl CNS - Neurological: Seizure - Trauma: esp CNS - Drug ingestion: amphetamines anticholinergics, thyroxine, <i>Heat stroke & 2 others</i>	

Question 2: You believe he has heat stroke. Outline your management of the key issues

Expected Response	Comments	Mark
Dehydration	Cool IV fluids , rapid infusion (monitor for pulmonary oedema). Ensure adequate circulating blood volume.	
Cooling Prompt “what are your goals?”	Needs urgent cooling. Candidate should describe a suitable method of cooling, and target core temperature. Exposure plus suitable external cooling method/s. Consider intubation, (issues are induction agents, paralysis (no sux), and doses, K+)	
Monitoring	Continuous core temperature continuous ECG Urine output (IDC) arterial line; CVC SpO2 Frequent electrolyte assay, esp K	

Question 3a: Some of his lab results are available:

Reference

Full Blood Count	Hb	180	g/L	(115-165)
	WCC	21.7	x 10 ⁹ / L	(3.5-11)
	Plt	45	x 10 ⁹ / L	(150-450)
Urea / Electrolytes	Na	145	mmol / L	(136-146)
	K	5.5	mmol / L	(3.5-5.0)
	Urea	23.5	mmol / L	(2.0-7.0)
	Creatinine	330	mcmol / L	(60-110)
	CK	24,000	IU / L	(60-220)

Describe and interpret these results.

Expected Response	Comments	Mark
Hb 180	Haemo-concentration , dehydration	
WCC 21.7	Stress response, possible sepsis	
Plt 45	Severe thrombocytopenia; ?DIC	
Urea 23.5, Cr 330	Acute renal failure , with moderate hyperkalaemia. Consistent with dehydration. Possible myoglobinuria from rhabdomyolysis. Anticipate low HCO ₃ .	
CK 24,000	Probable MM fragment. Rhabdomyolysis .	
Findings suggest heat stroke with end organ dysfunction (ARF/ rhabdo). Medical emergency. Indicates aggressive IV rehydration, cooling and nephro-protective measures.		

Question 3b: In light of these results how would you manage his rhabdomyolysis:

Renal failure	May respond to IV fluid loading, aim to ensure urine output (1-2ml/kg/hr) to facilitate myoglobin excretion Urine alkalinisation with bicarbonate – close arterial pH monitoring required ?Saline diuresis with mannitol or diuretics. Candidates should acknowledge potential caveats with this, such as electrolyte disturbance. Dialysis if not improving	
Disposition	Admit to ICU, may involve retrieval	
Liaisons	NOK; receiving unit (may be another hospital), ?retrieval team Military personnel	

Question 4: The patient temperature remains 42.1 after adequate initial treatment. Outline your further management.

Intubation	Appropriate dosage and drugs and explanation	
	Suxamethonium is fatal error- “so you would use suxamethonium in this situation”	

Question 5: How might this situation have been prevented

Expected Response	Comments	Mark
Preparation	Prevention is the key At least two of first four	
Clothing	Optimal garments: loose-fitting, lightweight clothing to allow body to cool. Avoid dark clothing if possible, on hot days.	
Hydration	Personnel training to ensure adequate fluid intake, and recognition of early symptoms of dehydration. Electrolyte solutions may benefit. Ensure participants have adequate supplies, and time to replenish fluids.	
Climate	Avoid activities in hottest parts of the day. Acclimatisation	
Medications	Standard precautions with all medications. Vigilance for potential heat-related problems with medications that affect hydration and heat dissipation.	
First Aid Capacity	Deploy 1 st aid officer(s) available at key locations to assist and identify at-risk participants 1 st Aid stations with appropriate supplies and equipment 1 st Aid training / certification for army medics	
Evacuation	Advise on medical criteria for evacuation; assist in policy development Protocols to receive field evacuees Communication systems	

Comments: (if you fail the candidate, please state why)

If the candidate fails the exam overall, what feedback would you suggest CIC provide for this SCE?