

SIMULATION CASE PSI-3

Learning outcomes:

By the end of this simulation the candidates will:

- Recognise the features of diabetic ketoacidosis
- Distinguish the features of shock v dehydration
- Demonstrate the ABCDE approach in assessment of the patient with DKA
- Initiate resuscitation of the patient with DKA

Simulation focus: Diabetes mellitus in ketoacidotic coma

Timing: 0-3 minutes: introduction; remaining time: split equally between simulation and debrief

Introduction [Environment and Set]

Prior to the start of the simulation: one instructor to:

1. [Environment] Brief candidate group to *check the Environment*:

Room	Candidates to set up the room appropriately	
Equipment	Candidates to check required equipment present and accessible	

Equipment list:

In addition to generic equipment list:

- Appropriate size manikin to be ready for simulation in room and covered until simulation commences

2. [Set] Give History

A 15 year old girl is brought into the Emergency Department by her mother who has noticed that she has become sleepy and has laboured breathing. She had been seen at another hospital 24 hours earlier with abdominal pain and a diagnosis of constipation was made.

Then leave the room for candidate group to prepare and after 2 minutes, return with instructor team and commence simulation

[Dialogue] Simulation

Initial handover *{to tell candidate on your arrival with the child as a Non-Paramedic SBAR to Team Leader}*

Situation	Laboured breathing with sleepiness	
Background	A 15 year old girl with lethargy and laboured breathing had been seen at another hospital 24 hours previously with abdominal pain and diagnosed with constipation. She responds to her mother's voice by briefly opening her eyes.	
Assessment	A	Patent
	B	Snoring respirations with a respiratory rate of 30/min and deep breathing.
	C	Pulse 160/min with poor volume. Capillary refill is 5 seconds.
	D	Responding to voice by eye opening, not answering questions
	E	-
Recommendation	Needs resuscitation	

Clinical course *{to be given as the simulation progresses}*

She is shocked and dehydrated. Blood glucose is 32 mmol/l, pH 7.03, PaO₂ 23.1 kPa on oxygen, PaCO₂ 2.5 kPa, potassium 6 mmol/l. Pulse volume improves and capillary refill shortens after one fluid bolus. She does not become fully alert but will respond to questioning after this treatment.

Key treatment points



Airway	Establish airway patency		
	Airway opening manoeuvres		
Breathing	High flow oxygen by face mask		
Circulation	IV-IO access		
	Appropriate blood tests (glucose, ketones, blood gas, urea & electrolytes)		
	Fluid bolus * 10ml/kg		
Specific therapy	Assess dehydration*		
	Calculate deficit*		
	Begin normal saline replacement*		
	Insulin infusion after 1-2 h*		
	Monitor for cerebral oedema (GCS) and ECG T-waves		
Handover to PICU Consultant	S		
	B		
	A		
	R		

[Closure] Debrief

Using the learning conversation, carry out the debrief of both the technical and non-technical elements of the simulation.

The debrief will be for the team as a whole and should focus on some or all of the following:

- Technical skills in an A, B, C, D, E format and guided by the KTPs; technical skills expected here include:
 - use of high-flow oxygen therapy
 - vascular access
 - assessment of dehydration v shock
 - assessment of AVPU and GCS
 - awareness of DKA protocol eg volumes and rates of deficit and maintenance
 - use of a nasogastric tube
- Non-technical skills, including qualities of team membership and leadership:

Team members	<ul style="list-style-type: none"> • Clear communication • Respect • Flexibility • Assertiveness • Ability to listen
Team leaders	All of the above, plus <ul style="list-style-type: none"> • Full overview of all aspects associated with child, parents and team • Prioritises according to KTPs • Summarises and re-evaluates

- Feedback on Environment, where required

Potential issues that may be raised for this specific simulation

- Mortality from cerebral oedema, hypokalaemia, aspiration
- Risks for cerebral oedema – ensure slow reduction of glucose <5mmol/l/hour and sodium rise, and discuss initiation of 0.05 – 0.1 U/kg/h insulin
- Monitor fluid input and output closely, commencing potassium when passing urine
- Fluid boluses should be given in 10ml/kg aliquots. Specialist advice should be sought if a second 10ml/kg bolus is needed. Calculations should be done carefully in a quiet environment – resus boluses over 20ml/kg are included as part of total fluid needs (DKA only). Continue to use normal saline.

At the end of the debrief, give the opportunity for candidates to ask questions, then summarise the key points

Assessment

Refer to the *Instructor guidance on simulations* document for a guide to the assessment of the simulation station. These assessments should be documented on the paper-based or electronic system for the final faculty meeting. Any scores of *serious concern* should be reported immediately to the course director.