

Paediatric DKA

Section I: Scenario Demographics

Scenario Title:	Paediatric DKA		
Date of Development:	(Revised Nov 2022)		
Target Learning Group:	Juniors (PGY 1 – 2)	Seniors (PGY ≥ 3)	All Groups

Section II: Scenario Developers

Scenario Developer(s):	Adapted from Adam Cheng, MD and Mark Adler, MD
Affiliations/Institution(s):	
Contact E-mail (optional):	

Section III: Curriculum Integration

Learning Goals & Objectives	
Educational Goal:	
CRM Objectives:	
Medical Objectives:	<ul style="list-style-type: none"> • Describe the signs and symptoms of a child presenting with diabetic ketoacidosis • Describe the signs and symptoms of moderate dehydration • Demonstrate the management a child in DKA <ul style="list-style-type: none"> ○ Initial stabilizing steps ○ Management of suspected cerebral edema

Case Summary: Brief Summary of Case Progression and Major Events

A 6-year-old girl is brought into ED by EMS. She has a 2-week history of fever and lethargy and has become very unwell in the last 24 hours. Learners are expected to take a history and carryout an A-E assessment. Through appropriate investigations they should recognise this child as being in DKA and commence management with the DKA protocol. The patient will then deteriorate, and learners are expected to consider cerebral oedema, manage appropriately, and involve ICU.



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References

Section IV: Scenario Script

A. Clinical Vignette: To Read Aloud at Beginning of Case

A 6-year-old girl has been brought in by EMS. The paramedics relay that she has been unwell for the past two weeks with fever and lethargy. In the last 24 hours she has been excessively drowsy. She is accompanied by her mother

B. Scenario Cast & Realism

Patient:	Computerized Mannequin	Realism:	Conceptual
	Mannequin	<i>Select most important dimension(s)</i>	Physical
	Standardized Patient		Emotional/Experiential
	Hybrid		Other:
	Task Trainer		N/A
Confederates	Brief Description of Role		
Paediatric RN	Acta as a skilled paediatric RN		



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C. Required Monitors

EKG Leads/Wires	Temperature Probe	Central Venous Line
NIBP Cuff	Defibrillator Pads	Capnography
Pulse Oximeter	Arterial Line	Other:

D. Required Equipment

Gloves	Nasal Prongs	Scalpel
Stethoscope	Venturi Mask	Tube Thoracostomy Kit
Defibrillator	Non-Rebreather Mask	Cricothyroidotomy Kit
IV Bags/Lines	Bag Valve Mask	Thoracotomy Kit
IV Push Medications	Laryngoscope	Central Line Kit
PO Tabs	Video Assisted Laryngoscope	Arterial Line Kit
Blood Products	ET Tubes	Other:
Intraosseous Set-up	LMA	Other:

E. Moulage

F. Approximate Timing

Set-Up:	5 min	Scenario:	20 min	Debriefing:	20 min
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Section V: Patient Data and Baseline State

A. Patient Profile and History

Patient Name: Charlotte Smith		Age: 6 years		Weight: 20kg	
Gender: M F		Code Status: Full			
Chief Complaint: Very unwell child: excessively drowsy, very poor energy, difficulty breathing, abdominal pains					
History of Presenting Illness: 2-week history of fever and lethargy					
Past Medical History:	Nil	Medications:	Nil		
Allergies: None known					
Social History: Lives with parents, no siblings, no social worker involvement, no smokers in the home					
Family History: Nil					
Review of Systems:	CNS:	Increased tiredness, progressively lethargic today			
	HEENT:	Excessive drinking			
	CVS:	Racing heart			
	RESP:	SOB			
	GI:	Growing but not gaining weight, 5kg weight loss, no vomiting. Vague abdominal pain			
	GU:	Polyuria, polydipsia, enuresis			
	MSK:	Nil	INT:	Nil	

B. Baseline Simulator State and Physical Exam

No Monitor Display		Monitor On, no data displayed		Monitor on Standard Display	
HR: 160/min		BP: 90/50		RR: 30/min	
				O ₂ SAT: 98% on air	
Rhythm:		T: 37.4°C		Glucose: HIGH	
				GCS: 13(E3 V4 M6)	
General Status: Looks unwell.					
CNS:	Sleepy, pupils normal				
HEENT:	Mucous membranes: mouth/ lips very dry, crying a few tears, flushed cheeks				



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CVS:	Normal heart sounds, capillary refill 3 seconds, pulses weak.
RESP:	Kussmaul respirations, lung fields clear
ABDO:	Mild diffuse tenderness
GU:	Nil
MSK:	Nil
	SKIN: Nil



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Scenario States, Modifiers and Triggers

Patient State	Patient Status	Learner Actions, Modifiers & Triggers to Move to Next State	
<p>1. Baseline State</p> <p>Rhythm: Sinus tachycardia HR: 160/min BP: 90/50 RR: 30/min O₂SAT: 98% T: 37.4°C</p>	Excessively drowsy	<p><u>Learner Actions</u></p> <p>-Takes a history: - A-E assessment: Airway:</p> <ul style="list-style-type: none"> Assesses airway Provides head tilt, chin lift, jaw thrust as needed <p>Breathing:</p> <ul style="list-style-type: none"> Check oxygen saturation Auscultates chest Identifies Kussmaul respirations <p>Circulation:</p> <ul style="list-style-type: none"> Monitors Checks HR, BP, capillary refill Inserts IV, keeps patient NPO Identifies sinus tachycardia <p>Assesses Hydration:</p> <ul style="list-style-type: none"> Capillary refill Skin turgor Mucous membranes Urine output Assigns degree of dehydration Strict monitoring of I&O's <p>CNS:</p> <ul style="list-style-type: none"> Establishes baseline exam Expresses need to monitor for cerebral edema <p>Medical Management</p> <ul style="list-style-type: none"> Orders bloodwork: CBC, diff, electrolytes, renal function, capillary gas, bedside glucose, serum osmolality and urine dip for glucose/ketones Bedside glucose: critical high Urine dip or ketones 4+ Identifies DKA as diagnosis <p>Begins DKA protocol:</p> <ul style="list-style-type: none"> Has patient weighed/asks for patient weight Considers need for IV normal saline bolus (10 cc/kg) 	<p><u>Modifiers</u></p> <p><i>Changes to patient condition based on learner action</i></p> <ul style="list-style-type: none"> If fails to check bedside glucose nurse to prompt "Do we have the glucose level?" If fails to recognise DKA nurse to prompt "I saw a child like this with DKA last week" <p><u>Triggers</u></p> <p><i>For progression to next state</i></p> <ul style="list-style-type: none"> If IV fluid delivered too aggressively OR all actions completed -> Stage 2. Cerebral oedema



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		<ul style="list-style-type: none"> Calculates IV rate assuming need to replace deficit evenly over 48 h Uses appropriate replacement fluid pending labs Orders IV insulin infusion <p>Uses flowsheet to track labs, vital signs</p>	
<p>2. Cerebral oedema</p> <p>Rhythm: Sinus tachycardia HR: 120/min BP: 110/60 RR: 24/min O₂SAT: 98% T: 37.5°C</p> <p>HS normal, Cap refill 2 seconds, pulses still weak</p> <p>Respiratory a bit less laboured</p> <p>Abdomen: seems less tender</p> <p>Rest of exam unchanged</p>	<p>Patient less responsive, GCS drops to 8: E3, V3, M3.</p> <p>Grumpy and tired, mumbling, eyes closed</p>	<p><u>Learner Actions</u></p> <p>-Reassessment of the patient</p> <p>Airway</p> <ul style="list-style-type: none"> Suctions the airway Reposition the head with head tilt, chin lift, jaw thrust Reapply oxygen mask <p>Breathing:</p> <ul style="list-style-type: none"> Reassesses Prepares for possible intubation – draws up rapid sequence intubation (RSI) medication <p>Circulation:</p> <ul style="list-style-type: none"> Reassesses HR/BP, capillary refill <p>CNS:</p> <ul style="list-style-type: none"> Reassesses GCS Institutes frequent neuro checks Looks for Cushing’s triad, posturing, etc. <p>Medical management:</p> <ul style="list-style-type: none"> Labs: Glc = critical high (at bedside); Urine 4+ ketones, 4+ glucose, SG 1.030 Continues DKA protocol Rechecks fluid-rate calculations Considers impending cerebral edema and trans-tentorial herniation Calls ICU for consultation 	<p><u>Modifiers</u></p> <p><u>Triggers</u></p> <p>If all steps complete or >10mins end scenario</p>



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		<ul style="list-style-type: none"> • Considers management of increased ICP: mannitol or 3% NS IV • Repeats bedside glucose • Orders repeat labs • Prepares to add glucose to IV fluids (“2-bag method”) to keep BG in 10–15 range • Calculates corrected Na 	
		Recognizes co-existing hypernatremia and need for slow rehydration	

Section VI: Scenario Progression



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Section VII: Supporting Documents, Laboratory Results, & Multimedia

Laboratory Results						
Na: 124	K: 5	Cl: 93	HCO ₃ : not available	BUN: not available	Cr: not available	Glu: 13mmol/L
Ca: not available		Mg: not available		PO ₄ : not available		Albumin: not available
ABG	pH: 7.1	PCO ₂ : 9	PO ₂ : 90	HCO ₃ : 10	Lactate: 3.5	
WBC: not available		Hg: not available		Hct: not available		Plt: not available

Images (ECGs, CXRs, etc.)	



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Ultrasound Video Files (if applicable)	



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Section VIII: Debriefing Guide

General Debriefing Plan			
Individual	Group	With Video	Without Video
Objectives			
Educational Goal:			
CRM Objectives:			
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Sample Questions for Debriefing			
<p>What is the basis of DKA?</p> <p>Why did this patient deteriorate?</p> <p>Is there anything that can be done to avoid this?</p> <p>What is the ongoing management once the child has stabilised?</p>			
Key Moments			
Recognition of DKA and initiating management protocol			
Recognition of cerebral oedema and initiating management protocol			
Calling for ICU support			

