

Diabetic Ketoacidosis SIM Case

Section 1: Case Summary

Scenario Title:	Diabetic Ketoacidosis
Keywords:	DKA, hyperkalemia arrest
Brief Description of Case:	<p>22-year-old male patient with poorly controlled T1DM presented with DKA. He independently walked into the triage complaining of nausea, vomiting and general malaise. He initially appeared well but suddenly decompensated and entered hyperkalemia induced cardiac arrest requiring resuscitation. Due to increased GCS and aspiration risk, patient also required advanced airway support.</p> <p>Case occurred in a rural community (Dawson Creek) where the hospital was staffed by one resident and two nurses in house. Lab and X-ray were available on a call-in basis. Staff physician is at home, 10 mins drive away and has decided to let you 'run the department' tonight.</p> <p>A RTVS physician was called to support the case virtually.</p>

Goals and Objectives	
Educational Goal:	Use RTVS support in the management of DKA and associated complications such as hyperkalemia cardiac arrest
Objectives: (Medical and CRM)	<ol style="list-style-type: none">1. Develop an approach to DKA2. Airway management with intubation skills3. To effectively run a cardiac arrest (ACLS)4. To manage a patient in ROSC
EPAs Assessed:	Effective communication skills and leadership

Learners, Setting and Personnel	
Target Learners:	<input checked="" type="checkbox"/> Junior Learners <input checked="" type="checkbox"/> Senior Learners <input type="checkbox"/> Staff
	<input type="checkbox"/> Physicians <input type="checkbox"/> Nurses <input type="checkbox"/> RTs <input type="checkbox"/> Inter-professional
	<input type="checkbox"/> Other Learners:
Location:	<input checked="" type="checkbox"/> Sim Lab <input type="checkbox"/> In Situ <input type="checkbox"/> Other:
Recommended Number of Facilitators:	Instructors:
	Sim Actors:
	Sim Techs:

Scenario Development	
Date of Development:	Jun 2021
Scenario Developer(s):	Rachel Chen
Affiliations/Institutions(s):	UBC/UHNBC
Contact E-mail:	
Last Revision Date:	Sept 29, 2021
Revised By:	Dr Brydon Blacklaws
Version Number:	



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Section 2A: Initial Patient Information

A. Patient Chart					
Patient Name: Steven		Age: 22	Gender: M	Weight: 65 kg	
Presenting complaint: nausea, vomiting, feeling unwell					
Temp: 36.7	HR: 127 regular	BP: 123/69	RR: 22	O ₂ Sat: 100%	FiO ₂ :
Cap glucose: 30.9		GCS: (E V M) 15			
Triage note: Walked in the ED by self. Has been feeling unwell for past few days. Developed nausea and vomiting overnight. Denies recent illness. No fever or chills.					
Given that it's just you and one nurse in house. Your preceptor is 20 minutes away; you decide to reach out to RTVS physician network for support.					
Allergies: NKDA					
Past Medical History: 1. T1DM 2. Hx of seizure with hypoglycemia			Current Medications: 1. Basaglar 15 units subcu b.i.d. 2. Insulin humalog 4 units subcu t.i.d. 3. Levetiracetam 1000 mg p.o. b.i.d.		

Section 2B: Extra Patient Information

A. Further History	
<i>Include any relevant history not included in triage note above. What information will only be given to learners if they ask? Who will provide this information (mannequin's voice, sim actors, SP, etc.)?</i>	
Patient admits to missed insulin injections before presenting to ED. Patient has fluctuating blood glucose level between 10 to 22 on average. He has a fear of hypoglycemia as it was associated with seizure activities in the past so he tends not to take his insulin regularly. He has had DKAs in the past in which he developed profuse nausea and vomiting. He thinks he's in DKA again because of the similar symptoms.	
Apart from some visual blurriness, he otherwise feels himself. There has not been any recent illness or fever.	
B. Physical Exam	
<i>List any pertinent positive and negative findings</i>	
Cardio: tachycardic at 120s. Regular rhythm. Normal S1/S2.	Neuro: alert and orient x 3. GCS 15
Resp: tachypenic at RR of 22 with bilateral clear air entry on auscultation.	Head & Neck: Dry oral mucosa with a distinct sweet and fruity breath odor.
Abdo: abdomen is soft and diffusely tender to palpation.	MSK/skin: no diabetic foot ulcer



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Section 3: Technical Requirements/Room Vision

A. Patient
<input checked="" type="checkbox"/> Mannequin (<i>specify type and whether infant/child/adult</i>)
<input type="checkbox"/> Standardized Patient
<input type="checkbox"/> Task Trainer
<input type="checkbox"/> Hybrid
B. Special Equipment Required
1. Intubation kit 2. BVM
C. Required Medications
1. Epinephrine 2. Calcium gluconate 3. Insulin IV with D50 4. Nebulized Ventolin
D. Moulage
Young adult male, dressed in casual clothing. Appears well.
E. Monitors at Case Onset
<input type="checkbox"/> Patient on monitor with vitals displayed
<input checked="" type="checkbox"/> Patient not yet on monitor
F. Patient Reactions and Exam
<i>Shallow rapid breathing. Sweet fruity breaths. Mild diffuse abdominal pain on palpation. Prior to cardiac arrest, begins to gag on vomit.</i>



Section 4: Sim Actor and Standardized Patients

Sim Actor and Standardized Patient Roles and Scripts	
Role	Description of role, expected behavior, and key moments to intervene/prompt learners. Include any script required (including conveying patient information if patient is unable)
Patient	Right before deterioration: alert care provider “I’m not feeling well.” Go into depressed GCS status. Start vomiting and gagging.



Simulation Scenario Template

Section 5: Scenario Progression

Scenario States, Modifiers and Triggers				
Patient State/Vitals	Patient Status	Learner Actions, Modifiers & Triggers to Move to Next State		Facilitator Notes
1. Baseline State Rhythm: regular HR: 127 BP: 123/69 RR: 22 O ₂ SAT: 100% T: 36.7°C GCS: 15	A/O x3. Appeared well. C/o of mild visual blurriness and stomach pain. When patient speaks, he reeks a strong fruity sweet odor.	<u>Expected Learner Actions</u> <input type="checkbox"/> Call RTVS – RUDI Doc. <input type="checkbox"/> Alert preceptor and call in additional nursing staff. <input type="checkbox"/> focused history and thorough physical exam ECG <input type="checkbox"/> monitor, full vitals <input type="checkbox"/> CBGM check <input type="checkbox"/> urine dip <input type="checkbox"/> 2 large bore IVs <input type="checkbox"/> IV fluid bolus + KCL <input type="checkbox"/> IV insulin	<u>Modifiers</u> - IV fluid -> HR drops to 110 - CBGM -> nurse notifies a reading > 30 - urine dip -> ++ ketones - ECG shows hyperkalemia <u>Triggers</u> - sudden clinical status deterioration	Lab technician on the way. Labs temporarily unavailable. Currently available labs: CBGM and urine ketones, both are significantly elevated.
2. Deterioration Rhythm: Sinus tachycardia HR: 150/min BP: quickly drops to 70/50 RR: 34 O ₂ SAT: 99% T: 36.5°C	Patient vomits. Gagging on secretion. GCS 7 E1V1M5	<u>Expected Learner Actions</u> <input type="checkbox"/> recovery position. <input type="checkbox"/> elevate head of bed, suction <input type="checkbox"/> re-evaluate GCS to reach the conclusion for intubation <input type="checkbox"/> BVM support while preparing for intubation <input type="checkbox"/> RSI intubation <input type="checkbox"/> labs (CBC, E10, VGB, lactate, serum ketones, osmols)	<u>Modifiers</u> - If not ventilated by 3 minutes, O ₂ SAT drops to 70% <u>Triggers</u> - arrest	RUDI physician please guide the case if learner asks for help
3. Cardiac arrest Rhythm: asystole HR: no pulse BP: not detectable RR: BVM rate	GCS 3	<u>Expected Learner Actions</u> <input type="checkbox"/> quality CPR <input type="checkbox"/> Epinephrine 1 mg Q3-5 min <input type="checkbox"/> Calcium 1-2 amps	<u>Modifiers</u> - labs-> metabolic acidosis, critical K level <u>Triggers</u>	



Simulation Scenario Template

O ₂ SAT: no tracing T: 36.5°C		<input type="checkbox"/> 1 amp D50 then insulin 10 units IV <input type="checkbox"/> Ventolin 20 mg nebulized <input type="checkbox"/> No dialysis or Internal Med	- treatment for hyperK given -> NSR - if CPR without hyperK treatment -> end of case after 5 cycles of CPR	
4. ROSC with NSR Rhythm: Sinus HR: 90 /min BP: 105/60 RR: BVM O ₂ SAT: 99% T: 36.5°C	GCS 3	<u>Expected Learner Actions</u> <input type="checkbox"/> repeat ECG <input type="checkbox"/> initiate sedation <input type="checkbox"/> post-intubation CXR <input type="checkbox"/> insert NG/OG <input type="checkbox"/> post cardiac arrest cooling <input type="checkbox"/> call for transfer to higher level of care	PTN answers the call -> end of case	



Simulation Scenario Template

Appendix A: Laboratory Results

<u>CBC</u> WBC 35.7 Hgb 149 Plt 497 <u>Lytes</u> Na 125 K 6.9 Cl 71 HCO ₃ 7 AG 54 Urea 10.4 Cr 132 Glucose 46 <u>Extended Lytes</u> Ca 2.8 Mg 0.77 PO ₄ 2.94 Albumin 53 TSH N/A <u>VBG</u> pH 7.1 pCO ₂ 15 pO ₂ 97 HCO ₃ 4.7 Lactate 12.6	<u>Cardiac/Coags</u> Trop N/A D-dimer N/A INR N/A aPTT N/A <u>Biliary</u> AST 516 ALT 94 GGT 130 ALP 128 Bili 5 Lipase 66 <u>Tox</u> N/A EtOH ASA Tylenol Dig level Osmols <u>Other</u> A1C 10.2 Urine ++ ketones COVID swab negative
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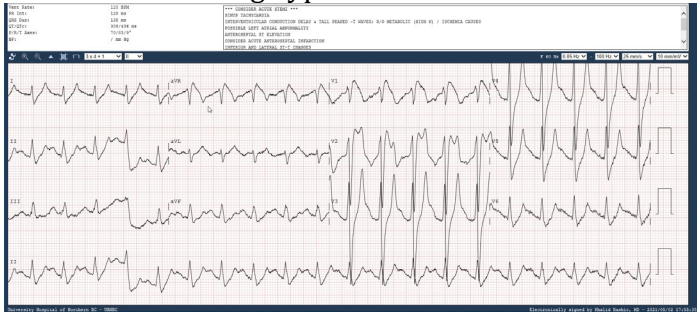


Simulation Scenario Template

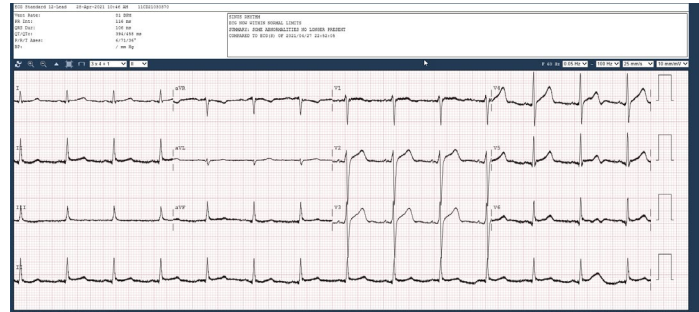
Appendix B: ECGs, X-rays, Ultrasounds and Pictures

Paste in any auxiliary files required for running the session. Don't forget to include their source so you can find them later!

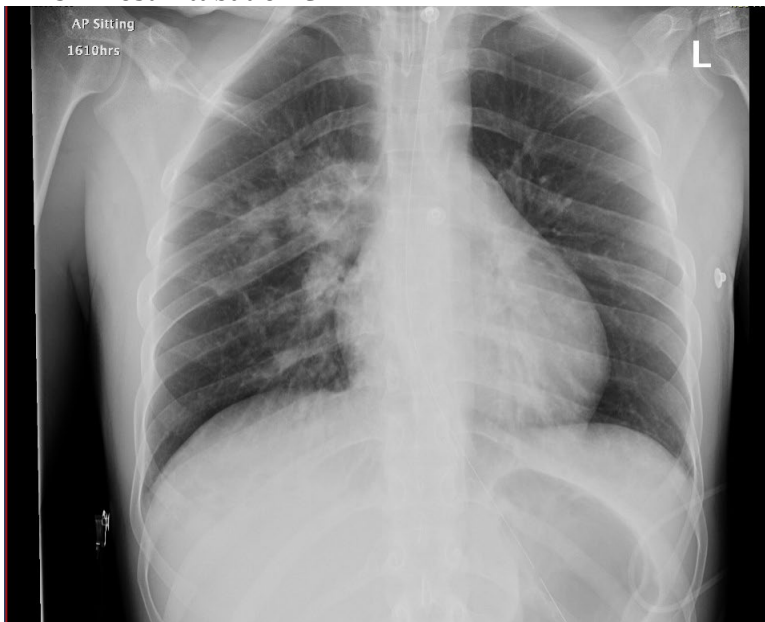
1. ECG showing hyperK



2. Post-arrest normalized ECG



3. Post intubation CXR



Simulation Scenario Template

Appendix C: Facilitator Cheat Sheet & Debriefing Tips

Include key errors to watch for and common challenges with the case. List issues expected to be part of the debriefing discussion. Supplemental information regarding any relevant pathophysiology, guidelines, or management information that may be reviewed during debriefing should be provided for facilitators to have as a reference.

References

- 1.
- 2.
- 3.

