

Beta Blocker Toxicity

Section 1: Case Summary

Scenario Title:	Beta Blocker Toxicity
Keywords:	Toxicology- Beta Blocker Overdose, hypotensive shock
Brief Description of Case:	30 year old male brought by a friend who found him dizzy and confused. Eventually collateral history is obtained that he overdosed on B-Blocker. Brdycardic and hypotension.

Goals and Objectives	
Educational Goal:	Approach to an altered LOC patient.
Objectives: (Medical and CRM)	1) Recognition of B blocker toxicity 2) Review ECG/POCUS findings in b blocker toxicity 3) Management of B blocker toxicity
EPAs Assessed:	

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

Scenario Development	
Date of Development:	March 8 2020
Scenario Developer(s):	UBC CCFP-EM Simulation Curriculum Group- Dr Jeanne Macleod
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Last Revision Date:	
Revised By:	
Version Number:	



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Section 2A: Initial Patient Information

A. Patient Chart					
Patient Name: John		Age: 30		Gender: male	
		Weight: 70kg			
Presenting complaint: Dizzy and confused					
Temp: 36.4		HR: 45		BP: 85/45	
		RR: 16		O ₂ Sat: 98%	
		FiO ₂ : R/A			
Cap glucose: 6		GCS: 12 (E V M) opens eye to voice, disoriented, localizes to pain			
Triage note: Had phoned friend earlier in day and had seemed distraught about recent breakup with girlfriend. Sounded intoxicated. When friend went to visit, found him sitting on floor, empty ETOH bottles. Brought to ED intoxicated. Appears intoxicated with alcohol on breath.					
Allergies: NKDA					
Past Medical History: Anxiety Depression Migraines			Current Medications: unknown		

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, confederate, SP, etc.)?</i>	
If learner asks, should delegate someone to ask friend further questions such as suicidality, did he notice any pill bottles around the apartment, Is the patient able to provide any past medical history.	
B. Physical Exam	
<i>List any pertinent positive and negative findings- No signs of trauma and unremarkable exam</i>	
Cardio:	Neuro:
Resp:	Head & Neck:
Abdo:	MSK/skin:
Other:	



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
C. Required Medications
D. Moulage
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>Include any relevant physical exam findings that require mannequin programming or cues from patient (e.g. – abnormal breath sounds, moaning when RUQ palpated, etc.) May be helpful to frame in ABCDE format.</i>



Section 4: Confederates and Standardized Patients

Confederate 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)
	Can role play friend who brought patient into the ED



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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: sinus HR: 45 BP: 85/45 RR: 20 O ₂ SAT: % 98 on r/a T: 36.4°C GCS: 12	<i>Patient opens eyes only to command, able to answer questions but disoriented to time. Able to push away examiner's hands but not following commands.</i>	<u>Expected Learner Actions</u> <input type="checkbox"/> Primary Survey, recognize that this is not a problem with airway or breathing but with circulation-hypotension. <input type="checkbox"/> large bore IV x 2-start fluid bolus NS 1 litre. <input type="checkbox"/> ON monitor <input type="checkbox"/> STAT ECG <input type="checkbox"/> Secondary survey- POCUS <input type="checkbox"/> Draws lab- Specify which drug levels are required.	<u>Modifiers</u> <i>Obtains history from friend-ask specifically for empty pill bottles/suicidal- only then will be provided history of possible B-blocker overdose</i> -Patient friend admits to empty pill bottle of propranolol at scene. Pharmanet confirms that script for 100x 40mg pills filled last week. Also on Venlafaxine 37.5 mg Po Bid, prescribed 60 pills last week.	Learner should summarize case: 30 yr old male hypotensive and bradycardic. Appears to have ETOH intoxication but also potential life threatening B-blocker intentional overdose. No signs of trauma/infection. I have given a fluid bolus and investigations have been ordered. Summarize US findings- no pericardial effusion, poor cardiac contractility, can't see IVC Call early to Poison Control and ICU Reassess post fluid bolus
2. Stage 2 HR=40 BP=70/40 RR=20 O ₂ Sat'n= 97% GCS=12	Patient LOC remains the same.	<u>Expected Learner Actions</u> <input type="checkbox"/> Reassess post fluid bolus <input type="checkbox"/> Recognize bradycardia AND QRS prolongation on ECG <input type="checkbox"/> Consider Pacing <input type="checkbox"/> Beta blocker OD treatment initiated. <input type="checkbox"/> Call ICU again if still not returned initial call.	<u>Modifiers</u> -If give glucagon patient starts to vomit- move to stage 3 - glucagon will only give transient improved HR/BP. <u>Triggers</u>	-atropine 0.5mg IV-repeat x 1 -Glucagon 5mg IV -Calcium Gluconate 30ml of 10% solution- 3g of Cagluc over 10 min. -Insulin 1 unit/kg bolus then infusion 1 unit/kg/hr + dextrose 50g/hr (insulin can be titrated up to effect with large doses reported in the literature)



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				<p>check glucose q 30 min</p> <p>Consider Lipid Emulsion if refractory -do this with support from poison control. 20% Intralipid 1.5cc/kg bolus then infusion 0.25cc/kg/min over 30-60 min. (approx. 600ml over 30 min in a 70kg adult).</p> <p>Bolus can be repeated x 2 if go into cardiac arrest.</p> <p>Consider giving NaHCO3 since propranolol causes QRS widening</p>
<p>3. Stage 3 HR= 45 BP=75/50 O 2 sat'n= 92%</p>	<p>Patient is gagging and ++ vomit</p>	<p><u>Expected Learner Actions</u></p> <p><input type="checkbox"/> Recognize need to protect airway</p>	<p>-Person managing airway should start to set up and go through plan/checklist</p> <p>-post tube placement verification and sedation.</p>	<p>Set up for RSI and need to optimize BP- start epinephrine infusion prior to intubation if not already started and have push dose epinephrine available.</p> <p>Have post sedation meds drawn up and ready.</p>
<p>4. Stage 4 HR= 60 BP= 80/60 O 2 sat'n 94% on vent</p>		<p><u>Expected Learner Actions</u></p> <p><input type="checkbox"/> Transfer of care to ICU</p>	<p><u>Modifiers</u></p> <p><u>Triggers</u></p>	<p>Consider notifying dialysis team or ECMO team if not improved.</p>



Appendix A: Laboratory Results

<u>CBC</u> WBC Hgb Plt <u>Lytes</u> Na K Cl HCO ₃ AG Urea Cr Glucose <u>Extended Lytes</u> Ca Mg PO ₄ Albumin TSH <u>VBG</u> pH pCO ₂ pO ₂ HCO ₃ Lactate	<u>Cardiac/Coags</u> Trop D-dimer INR aPTT <u>Biliary</u> AST ALT GGT ALP Bili Lipase <u>Tox</u> EtOH ASA Tylenol Dig level Osmols <u>Other</u> B-HCG
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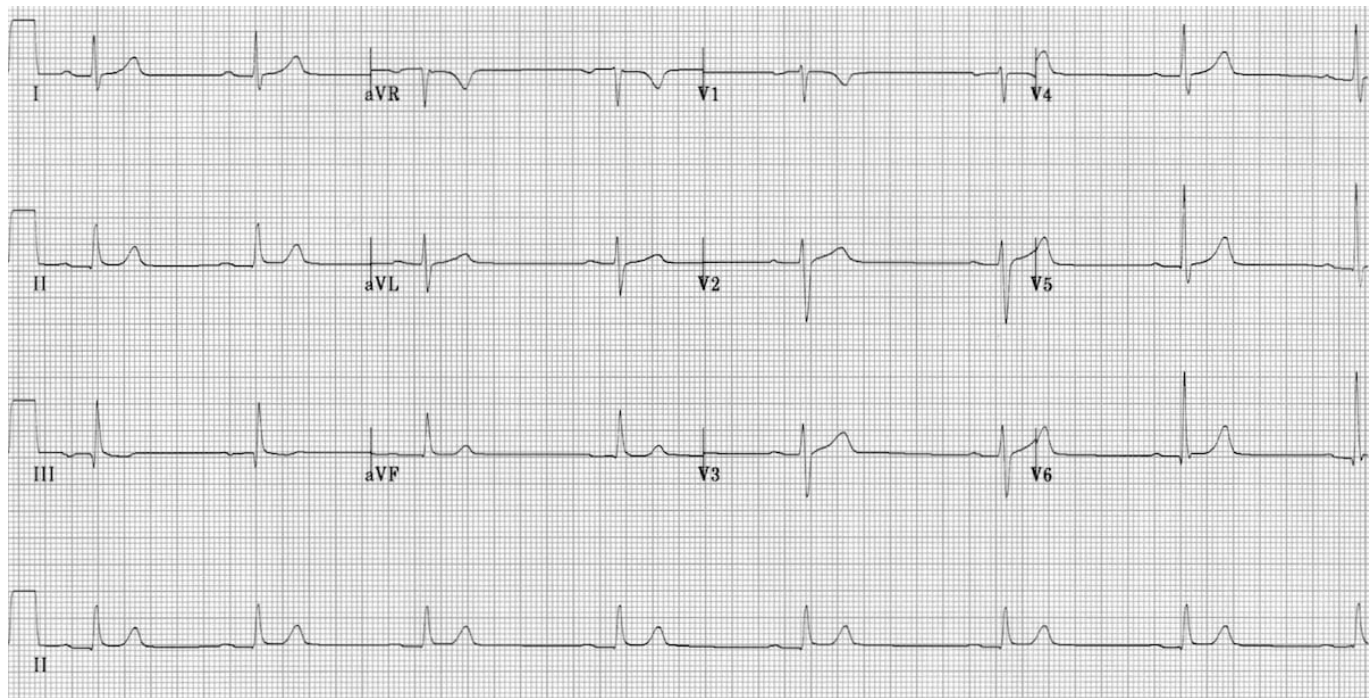
Appendix B: ECGs, X-rays, Ultrasounds and Pictures

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

US images of reduced LVEF:

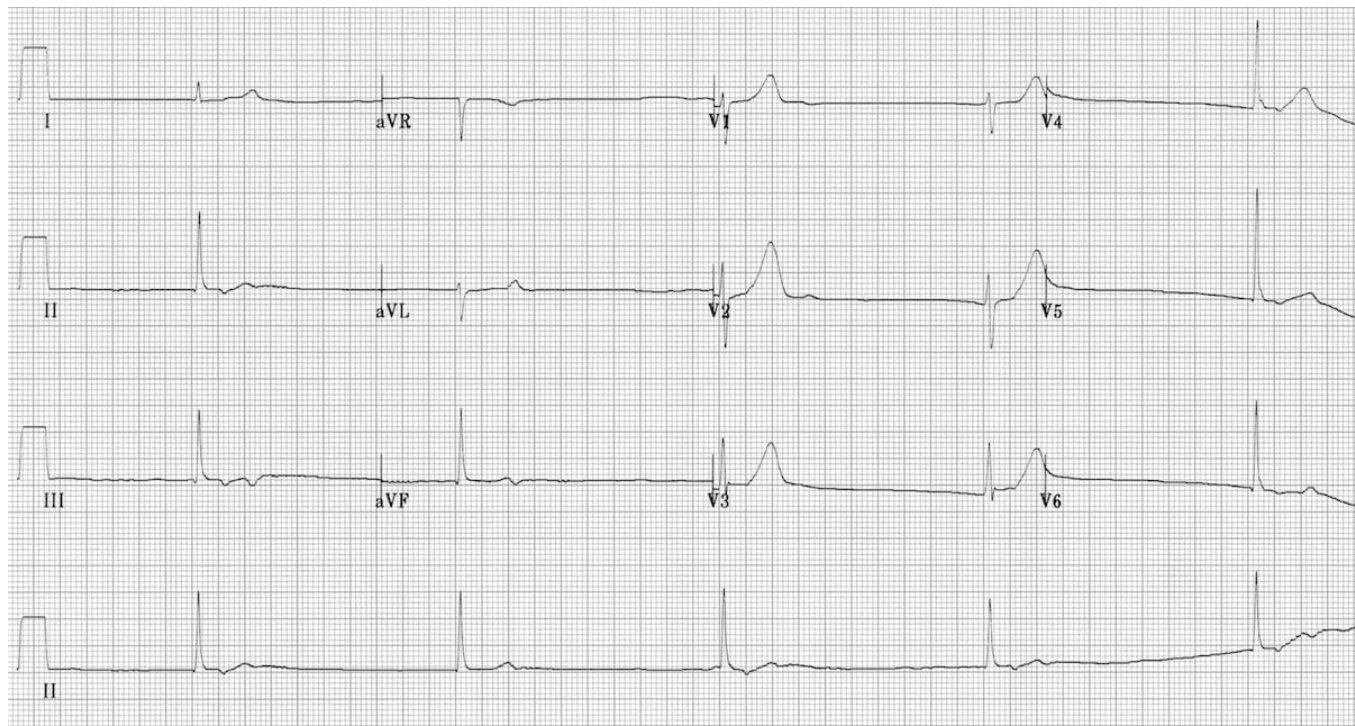
<https://www.bcpocus.ca/organscans/lvef/>

ECG first image:



<https://litfl.com/wp-content/uploads/2018/08/ECG-Sinus-bradycardia-1st-degree-AV-block.jpg>

ECG second image:



<https://litfl.com/wp-content/uploads/2018/08/ECG-junctional-bradycardia.jpg>

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.

-Review insulin use in B blocker toxicity:

High dose insulin exact mechanism of action is unknown but theory is that in b blocker cardiotoxicity, L-type calcium channels in cardiac myocytes are rendered ineffective. Insulin stimulates these L-type calcium channels making up for the loss of beta-adrenergic mediated activation. Cardiac myocyte relies on “calcium-induced calcium release” to contract. Insulin allows for the flow of calcium back into the myocyte and hence improved contractility.

-Propranolol can cause QRS widening so low threshold for giving NaHCO₃.

-Glucose levels can be normal or low in B blocker toxicity.

-Glucagon can be given 50mcg/kg up to 10 mg or as an infusion 2-10mg/hr.

References

1. <https://litfl.com/beta-blocker-overdose/> April 2, 2019
2. <https://emcrit.org/toxhound/sneak-in/> May 29, 2019
3. <https://litfl.com/intralipid-myth-or-miracle/> Sept 14, 2019

