**Section 1: Case Summary**

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| **S****cenario Title:** | **VT and Symptomatic Bradycardia 2° Hyperkalemia** |
| Keywords: | Ventricular Tachycardia, VT, ACLS, Brady, Bradycardia, Hyperkalemia |
| Brief Description of Case: | A 68 year old gentleman with a history of coronary artery disease (CAD), Diabetes Mellitus (DM) Type II, hypertension (HTN) and chronic kidney disease (CKD) requiring hemodialysis (HD) twice a week is being admitted for continuous renal replacement therapy (CRRT), bradycardia, and hypotension. Upon admission, he will quickly deteriorate to VT. After ROSC is achieved, he will return to a symptomatic bradycardia requiring transcutaneous pacing (TCP) or an increase in chrono- and iontropic & vasopressor support |

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| **Goals and Objectives** |
| Educational Goal: | Practice effective ACLS management and consider underlying etiology |
| Objectives:(Medical and CRM) | * Practice zero point survey / preparation for incoming patient
* Identify and practice correct ACLS algorithms for patient presentation
* Practice calling a Code Blue using the overhead paging system
* Practice documentation during a Code Blue
* Establish role clarity and distribute the workload accordingly
* Communicate effectively using closed-loop communication, case and plan of care summaries, making clear requests, and fostering input from team members
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| **Learners, Setting and Personnel** |
| Target Learners: | [x]  Junior Learners | [x]  Senior Learners | [x]  Staff |
| [x]  Physicians | [x]  Nurses | [x]  RTs | [x]  Inter-professional |
| [ ]  Other Learners:  |
| Location: | [x]  Sim Lab | [x]  In Situ | [ ]  Other:  |
| Recommended Number of Facilitators: | Instructors: 1 |
| Confederates: 1 (for handover report from EHS and to play part of patient while conscious) |
| Sim Techs: 1 |

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| **Scenario Development** |
| Date of Development: | 2019.12 |
| Scenario Developer(s): | Christina Choung |
| Affiliations/Institutions(s): | Fraser Health Authority |
| Contact E-mail: | simulation@fraserhealth.ca |
| Last Revision Date: |  |
| Revised By: |  |
| Version Number: | 1 |

**Section 2A: Initial Patient Information**

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| 1. **Patient Chart**
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| Patient Name: Ricardo Sanchez | Age: 68 | Gender: M | Weight: 68kg |
| Presenting complaint: Dizziness and Chest Pain |
| Temp: 36.6 | HR: 42 | BP: 76/52 | RR: 22 | O2Sat: 99% | FiO2: 6L FM |
| Cap glucose: 6.9 | GCS: (E V M ) E4 V5 M6 |
| Triage note / Handover: Ricardo is a 68 year old male with a history of CAD, DMII, HTN, and CKD requiring HD 2x/wk. He got back from a week-long vacation in Maui last night and this morning was complaining of feeling dizzy and was having chest pain. He looked like he was going to faint so his wife called EHS.Upon arrival to ED, he was bradycardic with a heart rate of 42 and a BP of 76/52. He had slight ST elevation and peaked T waves. GCS remains 15. He’s been started on Dopamine and Levophed and has been admitted to HAU for ongoing chemical therapy and CRRT. His GCS is 15, and he’s on 6L FM for an SpO2 of 99%. Has has 2 PIVs in situ. He’s just been wheeled into the room and his wife is on the way. |
| Allergies: NKDA |
| Past Medical History: * CAD
* DMII
* CKD
* HTN
* HD 2x/wk
 | Current Medications: * Metformin 500mg PO TID
* Metoprolol 50mg BID
* Ramipril 10mg daily
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**Section 2B: Extra Patient Information**

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| **A. Further History** |
| If asked:* Patient has missed last 2 HD appointments as was on vacation
* Yes, took all meds this morning
* Had a banana for breakfast
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| **B. Physical Exam** |
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| Cardio: Bradycardic with 1mm ST elevation and peaked T’s; hypotensive; cap refill ~4-5 seconds | Neuro: Normal |
| Resp: Normal | Head & Neck: Normal |
| Abdo: Normal | MSK/skin: Cool peripheries |
| Other: |

**Section 3: Technical Requirements/Room Vision**

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| **A. Patient** |
| [x]  Mannequin and monitor SimMan 3G or similar – requires defibrillation and pacing capabilities |
| [ ]  Standardized Patient |
| [ ]  Task Trainer |
| [ ]  Hybrid |
| **B. Special Equipment Required** |
| * Defibrillation cables
* IV drainage bags x2, one in each ACF
* Face Mask on manikin
* Levophed drip @ 10mcg/min
* Dopamine drip @ 10mcg/kg/min
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| **C. Required Medications** |
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| ACLS* Epinepherine (Cardiac) IV x2 (2mg)
* Amiodarone IV x3 (450mg)
* Atropine IV x2 (1mg)

Infusing* Dopamine 400mcg in 250mL
* Levophed 8mg in 250mL
 | Hyperkalemia* Calcium gluconate IV x3 (3g)
* Insulin R IV x1 (10 units)
* D50W x1 (50mL)

Sedation (for TCP)* Midazolam IV x1
* Fentanyl IV x 1
* Ketamine IV x1
 | Hypotension* Phenylephrine syringe x1 (100mcg/mL)
* Epinepherine syringe x1 (10mcg/mL)
* Norepinepherine x2 (8mg)
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| **D. Moulage** |
| n/a |
| **E. Monitors at Case Onset** |
| [ ]  Patient on monitor with vitals displayed[x]  Patient not yet on monitor |
| **F. Patient Reactions and Exam** |
| n/a |

**Section 4: Scenario Progression**

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| **Scenario States, Modifiers and Triggers** |
| Patient State/Vitals | Patient Status | Learner Actions, Modifiers & Triggers to Move to Next State  | Facilitator Notes |
| **1. Patient Arrival**Rhythm: Bradycardia w/ ST Elevation + HyperkalemiaHR: 55BP: 95/60RR: 22O2SAT: %99T: 36.6oC GCS: 15 | DizzyOtherwise normal | Expected Learner Actions [ ]  Place monitors on patient[ ]  Begin assessment[ ]  Take vital signs | Modifiers- n/aTriggers-15 seconds after monitors placed, move to Phase 2 |  |
| **3. VT**Rhythm: VTHR: 180BP: --RR: --O2SAT: ↓ %68 over 40 secT: 36.6oC GCS: 3 | Unresponsive | Expected Learner Actions [ ]  Recognize change in status[ ]  Call a Code Blue[ ]  Begin compressions[ ]  Run through VT ACLS algorithm* Defibrillate ASAP
* Consider Epinephrine 1 mg IV first; Amiodarone 300mg IV later
* 2 min CPR in-between; repeat
* Pulse check q2min prior to defibrillation

[ ]  Begin CPR* 100-120/min
* 2 inches deep; adequate recoil
* BVM with oral or advanced airway

[ ]  Place oral or advanced airway; minimize interruptions[ ]  Consider management of hyperkalemia:* Calcium Gluconate
* Insulin/D50W
 | Modifiers-if intubated 🡪 increase RR to 12 (or if able, match what person delivering manual ventilations is doing) AND set EtCO2: -EtCO2: high-quality CPR = 15-20 mmHg-EtCO2: medium-quality CPR = 10-15 mmHg-EtCO2: poor-quality CPR = <10 mmHg-if advanced airway placed + good quality CPR 🡪 ↑ SpO2 to 86% over 40 seconds-if Calcium Gluconate or Insulin IV + D50 given: in Phase 3, patient will not have Hyperkalemia/peaked T’sTriggers-proceed to Phase 3 after at least 2 attempts at defibrillation and one dose of Epinephrine |  |
| **3. ROSC and Bradycardia**Rhythm: Bradycardia w/ ST Elevation + HyperkalemiaHR: 42BP: 76/42RR: 22O2SAT: ↑ %99 over 20 secT: 36.6oC GCS: 4 |  | Expected Learner Actions [ ]  Recognize change in rhythm; recognize ROSC/pulse[ ]  Re-assess patient[ ]  Take Vital Signs[ ]  Implement Symptomatic Bradycardia ACLS algorithm* Atropine 0.5mg IV
* Consider TCP
* Consider Dopamine infusion
* Consider Epinephrine infusion

[ ]  If TCP, consider analgesic[ ]  Consider management of hyperkalemia (if not yet done):* Calcium Gluconate
* Insulin/D50

[ ]  Consider management of hypotension:* Norepinephrine
* Phenylephrine
* Epinephrine push

[ ]  Summary of case and plan of care verbalized by team coordinator/lead | Modifiers-if Calcium Gluconate given 🡪 patient will vomit- if Atropine given or Dopamine infusion or Epinephrine infusion started 🡪 HR ↑ to 60 and BP ↑ 90/50 -if Phenylephrine push, Norepinephrine drip, or Epinephrine push given **after** Atropine/TCP/Dopamine/Epi infusion 🡪 BP ↑ 105/65-if Phenylephrine push, Norepinephrine drip, or Epinephrine push given **before** Atropine/TCP/Dopamine/Epi infusion 🡪 BP ↑ 82/46Triggers-Case ends after summary and plan of care verbalized by Team Coordinator/Lead |  |

**Appendix A: Laboratory Results**

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| CBC WBC 9.6 Hgb 128 Hct .40 Plt 283Lytes Na 168 K 6.4 Cl 122 HCO3 38 Urea 14.9 Cr 368 Glucose 7Extended Lytes Ca 3.1 Mg 1.8 PO4 5.2  | Cardiac/Coags Trop .06 INR 1.2 aPTT 12.5Biliary AST 36 ALT 50 GGT 49 Bili 15 Lipase 50 |

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

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| <https://i1.wp.com/iem-student.org/wp-content/uploads/2019/11/hyperkalemia-and-bradycardia-dr.-smiths-ecg-blog.jpg?w=600&ssl=1> |

**Appendix C: Facilitator Cheat Sheet & Debriefing Tips**

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| *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**

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