Section I: Scenario Demographics

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| Scenario Title: | Cardiac Arrest |
| Date of Development: | (31/10/2018) |
| Target Learning Group: | Juniors (PGY 1 – 2)  Seniors (PGY ≥ 3)  All Groups |

Section II: Scenario Developers

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| Scenario Developer(s): | Krista Dowhos MD & Alim Nagji CCFP-EM |
| Affiliations/Institution(s): | McMaster University |
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Section III: Curriculum Integration

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| Learning Goals & Objectives | |
| Educational Goal: | To practice managing cardiac arrest in the setting of a STEMI |
| CRM Objectives: | 1. Communicate effectively within an interdisciplinary team during a resuscitation 2. Prioritize tasks such as medications, interventions, investigations and consultations in a critically ill patient 3. Delegate tasks amongst team members |
| Medical Objectives: | 1. Recognize the critically ill patient and provide BLS care including high quality CPR 2. Provide ACLS to a patient with cardiac arrest including recognizing shockable and non-shockable rhythms, and treating shockable rhythms with early defibrillation 3. Provide post-cardiac arrest care in a patient with ROSC including targeted temperature management and identifying and treating reversible causes of cardiac arrest |

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| Case Summary: Brief Summary of Case Progression and Major Events |
| A 65-year old man presents to the ED via EMS with chest pain. He is initially mildly hypotensive and tachycardic. An ECG will show an anterior STEMI. The team will need to activate the cath lab, which will be delayed by 20 minutes. The patient will go into VT with a pulse, and the team will need to provide synchronized cardioversion. The patient will then go into VFib arrest followed by VT arrest, and the team will need to perform CPR and defibrillate for both scenarios. The patient will subsequently go into a PEA rhythm, at which time the team should continue to give CPR, epinephrine and not defibrillate. Lastly, the patient will have ROSC and the team will need to provide post-ROSC care. The case ends with the cath lab calling to say they are ready for the patient. |

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| References |
| Template from https://emsimcases.com |
| ECG from https://lifeinthefastlane.com |
| Chest x-rays from http://jetem.org |

Section IV: Scenario Script

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| A. Clinical Vignette: To Read Aloud at Beginning of Case | | | | | | | | | | |
| A 65-year-old male presents to the ED from a local fitness centre via EMS with chest pain. He was given 325 mg ASA PO in the ambulance. He arrives alert and oriented, distressed and clutching his chest. | | | | | | | | | | |
| B. Scenario Cast & Realism | | | | | | | | | | |
| Patient: | Computerized Mannequin | | | | | Realism:  *Select most important dimension(s)* | | | Conceptual | |
| Mannequin | | | | | Physical | |
| Standardized Patient | | | | | Emotional/Experiential | |
| Hybrid | | | | | Other: | |
| Task Trainer | | | | | N/A | |
| Confederates | Brief Description of Role | | | | | | | | | |
| Paramedic | Provide a history of the patient’s condition and treatment in the field and in ambulance | | | | | | | | | |
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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 | | | | | | | | | | | |
| Diaphoresis spray | | | | | | | | | | | |
| F. Approximate Timing | | | | | | | | | | | |
| Set-Up: | | 3 min | | Scenario: | 15 min | | | Debriefing: | | 20 min | |

Section V: Patient Data and Baseline State

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| A. Patient Profile and History | | | | | | | | | | | | | | | |
| Patient Name: Daniel Cook | | | | | | Age: 65 | | | | | | | | Weight: 100 kg | |
| Gender:  M  F | | | | | | Code Status: Full code | | | | | | | | | |
| Chief Complaint: Chest pain | | | | | | | | | | | | | | | |
| History of Presenting Illness: This patient was at the gym, walking on the treadmill, and developed chest pain. He describes it as crushing and radiating to his jaw. He finds it hard to take a deep breath. He feels nauseous and sweaty. He occasionally gets mild chest pain when he works out, but says it is never this bad. He has otherwise been feeling well lately. | | | | | | | | | | | | | | | |
| Past Medical History: | | HTN | | | | | Medications: | | | | | Lipitor 40 mg PO daily | | | |
|  | | Hypercholesterolemia | | | | |  | | | | | Ramipril 5 mg PO daily | | | |
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| Allergies: None | | | | | | | | | | | | | | | |
| Social History: ex-smoker (quit 20 years ago), drinks 7 beers per week, no recreational drugs. | | | | | | | | | | | | | | | |
| Family History: Father had an MI at 70. | | | | | | | | | | | | | | | |
| Review of Systems: | | CNS: | | | Feels lightheaded, no focal neurological complaints | | | | | | | | | | |
| HEENT: | | | Jaw pain | | | | | | | | | | |
| CVS: | | | Chest pain described as retrosternal and “crushing” with radiation to radiating to jaw. | | | | | | | | | | |
| RESP: | | | “Hard to take deep breath”, no cough or hemoptysis | | | | | | | | | | |
| GI: | | | Nauseous, no vomiting | | | | | | | | | | |
| GU: | | | No complaints | | | | | | | | | | |
| MSK: | | | Generalized weakness | | | | | | | | INT: | | Diaphoretic |
| B. Baseline Simulator State and Physical Exam | | | | | | | | | | | | | | | |
| No Monitor Display | | | | Monitor On, no data displayed | | | | | | | Monitor on Standard Display | | | | |
| HR: 100/min | | | BP: 100/60 | | | | | RR: 20/min | | | | | | | O2SAT: 90% |
| Rhythm: sinus | | | T: 37oC | | | | | Glucose: 7 mmol/L | | | | | | | GCS: 15 (E5 V5 M5) |
| General Status: **distressed, clutching chest, diaphoretic** | | | | | | | | | | | | | | | |
| CNS: | Cranial nerves 2-12 intact. Peripheral neurological exam normal. | | | | | | | | | | | | | | |
| HEENT: | No jaundice or central cyanosis, mucous membranes slightly dry | | | | | | | | | | | | | | |
| CVS: | Normal s1/s2, no murmurs or extra sounds | | | | | | | | | | | | | | |
| RESP: | GAEB, no crackles or wheezes on auscultation | | | | | | | | | | | | | | |
| ABDO: | Abdomen soft, non-tender, non-distended, no masses or HSM, no rebound tenderness | | | | | | | | | | | | | | |
| GU: | Normal | | | | | | | | | | | | | | |
| MSK: | ¾ strength in upper and lower extremities | | | | | | | | SKIN: | **Diaphoretic**, no rashes, no mottling, no peripheral cyanosis. | | | | | |

Section VI: Scenario Progression

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| Scenario States, Modifiers and Triggers | | | |
| Patient State | Patient Status | Learner Actions | Modifiers & Triggers to Move to Next State |
| **1. Baseline State**  Rhythm: sinus  HR: 100/min  BP: 100/60  RR: 20/min  O2SAT: 90%  T: 37oC | Distressed, clutching chest, diaphoretic, GCS 15 | 1st round state 1:  -ABCs, IV, O2, monitor  -Apply defibrillator pads  -ECG **(STEMI)**  -Portable CXR **(normal)**  -Cap glucose **(7.0)**  -Labs  -250-500 cc IV bolus  - Activate cath lab **(20 minute delay)** | Modifiers  *Changes to patient condition based on learner action*  - Bolus given 🡪 BP 105/65  - O2 provided 🡪 O2SAT 94%  Triggers  *For progression to next state*  - After 3 mins, HR increase to 180 🡪 **2. VT with a pulse** |
| **2. VT with a pulse**  HR 180  BP 80/45  RR 7  O2SAT: 85% | Pulse present, patient drowsy, GCS 11 (E3 V3 M5) | -Synchronized cardioversion | Triggers  - Cardioversion or after 1 min 🡪 **3.Vfib arrest** |
| **3. VFib arrest**  HR ??  Rhythm: VFib  BP ??  O2SAT 75% | Pulseless, unresponsive | -High quality CPR with pulse check q2 mins  -Defibrillate  -Amiodarone 300 mg IV | Triggers  Defibrillation or after 3 min 🡪 **4. VT arrest** |
| **4. VT arrest**  HR 180  Rhythm: VT  BP ??  O2SAT 75% | Pulseless, unresponsive | -High quality CPR with pulse check q2 mins  -Defibrillate  -Amiodarone 150 mg IV  -Epinepherine 1 mg IV q3min | Triggers  Defibrilation or after 3 mins 🡪 **5. PEA arrest** |
| **5. PEA arrest**  HR ??  Rhythm: PEA  BP ??  O2SAT 75% | Pulseless, unresponsive | -High quality CPR with pulse check q2 mins  -Epinepherine 1 mg IV q3min | Triggers  - After 3 mins **🡪 6. ROSC** |
| **5. ROSC**  Rhythm: sinus  HR: 60/min  BP: 105/60  RR: 9/min  O2SAT: 92%  T: 36oC | Pulses present GCS 7 (E1 V2 M4) | -Targeted temperature management (32-34  oC; IV cold saline 2-3 mL/kg or cooling vest)  -Repeat ECG  -Consider intubation  -Post intubation CXR  -Heparin 5000 units IV  -Place NG  -Ticagrelor 180 mg NG  -Consider vasopressor to target MAP >65 (e.g. epinephrine 0.1-0.5 mcg/kg/min) | Triggers  After 2 mins 🡪 cath lab ready for patient  **END CASE** |

Section VII: Supporting Documents, Laboratory Results, & Multimedia

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| Laboratory Results |
| Labs will not be back before the case ends. |

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| ECG showing anterior STEMI  ../Screen%20Shot%202018-11-04%20at%201.29.36%20PM.png | |
| Portable CXR – normal ../Screen%20Shot%202018-11-04%20at%204.27.45%20PM.png | Portable CXR – post-intubation  ../Screen%20Shot%202018-11-04%20at%204.27.15%20PM.png |

Section VIII: Debriefing Guide

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| General Debriefing Plan | | | | |
| Individual | Group | | With Video | Without Video |
| Objectives | | | | |
| Educational Goal: | | To practice managing cardiac arrest in the setting of a STEMI | | |
| CRM Objectives: | | 1. Communicate effectively within an interdisciplinary team during a resuscitation 2. Prioritize tasks such as medications, interventions, investigations and consultations in a critically ill patient   Delegate tasks amongst team members | | |
| Medical Objectives: | | 1. Recognize the critically ill patient and provide BLS 2. Provide ACLS to a patient with cardiac arrest 3. Recognize shockable and non-shockable rhythms and treat shockable rhythms with defibrillation 4. Provide appropriate post-cardiac arrest care in a patient with ROSC | | |
| Sample Questions for Debriefing | | | | |
| 1. What is your approach to the initial assessment and management of the critically ill patient (e.g. ABCs, IV/O2/monitor)? 2. Describe the communication and team dynamic during the resuscitation. What do you feel went well? What do you feel could have been done better? 3. What are the various rhythms a patient in cardiac arrest can have and how to do you manage them? 4. What is your approach to post-ROSC care?   Reassess vital signs  Targeted temperature management   * Maintain temperature of 32-34 oC   Optimize oxygenation and ventilation   * Consider intubation * CXR to ensure proper ETT placement * Keep end tidal CO2 30-40 * Use highest FiO2 until ABG available   Optimize cerebral perfusion/avoid and treat hypotension   * Target MAP >65 mm Hg * Treat hypotension with vasopressors (e.g. epinephrine 0.1-0.5 mcg/kg/min)   Identify and treat reversible causes of cardiac arrest   * Hypovolemia * Hydrogen ions * Hypoxia * Hyper/hypokalemia * Hypothermia * Trauma * Tamponade * Thrombus (pulmonary or coronary) * Toxins * Tension pneumothorax | | | | |
| Key Moments | | | | |
| Initial assessment and stabilization of the critically ill patient | | | | |
| Activation of the cath lab | | | | |
| Synchronized cardioversion of VT with a pulse | | | | |
| Unsynchronized defibrillation of VT arrest and Vfib | | | | |
| Continued CPR for PEA arrest | | | | |
| Administer post-ROSC care | | | | |