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| Top of Form   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | http://meds.queensu.ca/simlab/assets/header-left.jpg | [http://meds.queensu.ca/simlab/assets/header-title.jpg](http://meds.queensu.ca/simlab) | |  |  |  | | --- | --- | --- | | http://meds.queensu.ca/simlab/assets/header-right-01.jpg | http://meds.queensu.ca/simlab/assets/header-right-02a.jpg |  | | [Queen's logo](http://www.queensu.ca/) | |     **Queen’s University Simulation Scenario Template** | | | | | | |
| **Course:** | SR Rounds: Tox II | | | | | |
| **Case Title:** | Hydrofluoric Acid Burns | | | | | |
| **Brief Case Description** | | | | | | |
| **A 37 year old man comes to the ED with severe pain in his right arm after using some rust remover at home (10% HF). He subsequently suffers a Torsades des Pointes cardiac arrest due to hypocalcemia and hypomagnesemia.**  **Subcutaneous calcium gluconate, IV calcium gluconate, and overdrive pacing are required to successfully resuscitate this patient** | | | | | | |
| **Searchable Keywords:** | | | | | | |
| 1. **Hydrofluoric Acid** 2. **Hypocalcemia** 3. **Torsades des Pointes** | | | | | | |
| **Target Audience:** | SR’s | | | | | |
| **Number of Participants:** | 5 | | | | | |
| **CanMeds Roles :** |  | Medical Expert |  | Manager |  | Scholar |
|  |  | Communicator |  | Collaborator |  | Professional |
|  |  | Health Advocate |  |  |  |  |
| **Objectives:** |  | | | | | |
| * **Knowledge** | Manage the local and systemic toxicities of HF acid poisoning | | | | | |
| * **Skills** | Overdrive Pacing  SC Injection of calcium gluconate  Intra-arterial infusion of calcium gluconate | | | | | |
| * **Behaviour** |  | | | | | |

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| **Stem:** *Detailed description of exercise* | |
| **Corey MacIntosh is a 37 year old man who was using a rust removing compound to remove some rust from his lawn mower. He accidently spilled this solution onto his hand and forearm. The solution is 10% Hydrofluoric acid.**  **He has mild cutaneous burns to his forearm, but his pain is significantly more severe that would be expected from the physical exam. The residents should recognize this as HF burns and immediately apply calcium gluconate jelly to the affected area and/or inject calcium gluconate (0.5 cc of 10% calcium gluconate per 1 cm2).**  **This improves the pain, but fails to alleviate the systemic toxicity. HF dissociates in the tissue. H+ produces local burns, and the F- chelates Ca2+, and results in systemic hypocalcemia, hypomagnesemia, and hyperkalemia. He is found to have these electrolyte abnormalities, and a long QT on his ECG.**  **He suffers a cardiac arrest due to Torsades des Pointes. IV MgSO4 and IV CaCl2 is required for the resuscitation to be successful, and they will also be required to overdrive pace the patient.** | |
| **Roles:** |  |
| **Script (for each role)** |  |
| **Scenario Tips:**   * *Tips to future instructors to keep the scenario flowing.* * *Anticipated difficulties* |  |

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| **Scenario Details:** | |
| **Demographics:**   * Name: * Age: * Sex: * BMI | Corey MacIntosh  37  Male |
| **Chief Complaint:** | Arm and hand pain after spilling rust remover (10% HF) onto his arm and hand |
| **Past Medical History:** | None |
| **Medications:** | None |
| **Allergies:** | Penicillin |
| **Lab data:** (provided if requested) | *See Lab sheet: Hypocalcemia, Hypomagnesemia, Hyperkalemia* |
| **Imaging:** (provided if requested) | *N/A* |
| **ECG:**  (provided if requested) | *NSR with Long QT* |

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| **Initial Physical Examination Findings: (Normal if left blank)** | |
| **Vital signs:** | |
| Temperature | **37.1** |
| HR | **122** |
| BP | **134/80** |
| RR | **20** |
| O2 saturation | **100** |
| Finger stick glucose | **8.5** |
| Weight (kg) | **82** |
| **Cardiovascular:** | |
| Heart rate/rhythm | **Sinus Tachy** |
| Heart sounds | **Normal** |
| JVP | **Normal** |
| Peripheral pulses | **Normal** |
| Evidence of cyanosis? | **No** |
| Diaphoresis | **No** |
| Other |  |
| **Respiratory:** | |
| Respiratory rate/pattern | **Normal** |
| Accessory muscle use? | **Normal** |
| Lung sounds | **Normal** |
| Evidence of fatigue? | **No** |
| Other |  |
| **Abdominal:** | |
| Visible signs of pathology? | **No** |
| Bowel sounds | **No** |
| Peritoneal signs? | **No** |
| Tenderness? | **No** |
| Hepatosplenomegaly? | **No** |
| Signs of ascites? |  |
| Other |  |
| **Neurological:** | |
| Level of consciousness & Behaviour | **Normal: Severe arm and hand pain** |
| Muscle tone |  |
| Motor |  |
| Sensory |  |
| Reflexes |  |
| Other |  |
| **Head/Ears/Eyes/Nose/Throat/Skin:** | |
| Visible abnormalities |  |

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| **Flow Table:** | | | | | | | |
| **Time or Stage:** | 0:00 | 2 min after SC Injections | After Defib | Recurrent Torsades | After MgSO4, CaCl2 and Overdrive Pacing |  |  |
| **Heart rhythm:** | Sinus | Torsades | Sinus | Torsades | Paced |  |  |
| **Heart rate:** | 122 |  | 130 | 0 | 100 |  |  |
| **Heart Sounds:** | Normal |  |  | 0 |  |  |  |
| **Blood pressure:** | 134/80 | 0 | 90/60 | 0 | 76/30 |  |  |
| **Respiratory rate:** | 20 | 0 |  | 0 | Vent |  |  |
| **Respiratory Pattern:** | Normal | Absent | Normal | 0 | Vent |  |  |
| **O2 saturation:** | 100 RA | 0 | 93 | 0 | 90 |  |  |
| **Temperature:** | 37.1 |  |  | 0 |  |  |  |
| **Glucose** | 8.5 |  |  | 0 |  |  |  |
| **Eyes:** | Open | Closed | Closed | Closed | Closed |  |  |
| **Pupils:** | Normal |  |  |  |  |  |  |
| **Specific simulator dialogue:** | Pain |  |  |  |  |  |  |
| **Other:** |  |  |  |  |  |  |  |

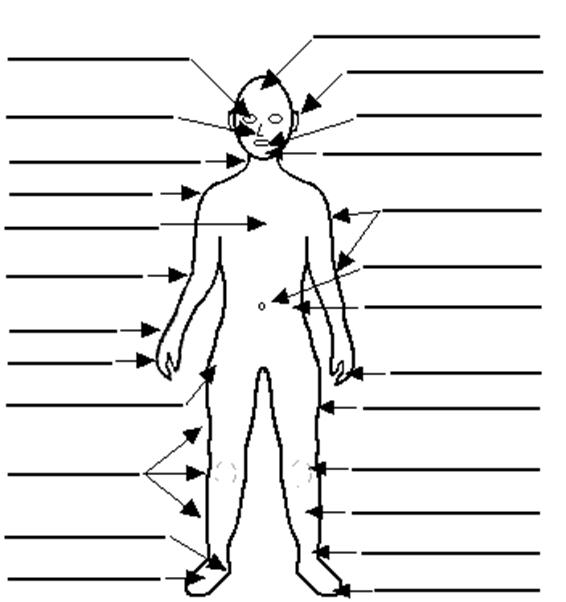
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| **Flow Diagram:** |
| Insert specific scenario flow diagram showing pathways for anticipated actions. Each section of the diagram should correspond to a column on the Flow Table above.  example |

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| **Simulator Requirements:** |  | |
| **Environment:** |  | ER |
|  |  | Hospital Ward |
|  |  | ICU |
|  |  | Other |
| **Required simulator capabilities:** |  | Adult |
|  |  | Child |
|  |  | Ability to talk |
|  |  | Ability to open and close eyes |
|  |  | Ability to change pupil size |
|  |  | Output of basic cardiorespiratory rhythms |
|  |  | Ability to change vital signs |
|  |  | Ability to perform CPR |
|  |  | Ability to deliver energy via LifePack |
|  |  | Ability to gain IV access |
|  |  | Ability to gain IO access |
|  |  | Ability to get 12 and 15 lead EKG’s |
|  |  | Ability to deliver drugs |
|  |  | Ability to ventilate |
|  |  | Ability to intubate |
|  |  | Ability to catheterize |
|  |  | Ability to needle decompress |
|  |  | Ability to insert chest tube |
|  |  | Ability to seize |
|  |  | Ability to simulate cyanosis |
|  |  | Other: |
| **Task trainers required:** |  | IV access trainer |
|  |  | IO access trainer |
|  |  | Lumbar puncture trainer |
|  |  | Central line access trainer (IJ, femoral, subclavian) |
|  |  | Chest tube trainer |
|  |  | Cricothyrotomy trainer |
|  |  | Pericardiocentesis trainer |
|  |  | Thoracotomy trainer |
|  |  | Other: |
| **Communications Equipment:** |  | One way wireless (confederate) |
|  |  | Two way wireless (confederate) |
|  |  | Overhead Speakers |
|  |  | Telephone |
|  |  | Pager |
|  |  | Other: |

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| **Moulage:** |

*Describe any scenario-specific moulage on the diagram below:*

Red Burn Marks to right hand and forearm



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| **Mannequin Clothing** | |
|  | Hospital gown |
|  | Formal work attire |
|  | Casual attire |
|  | Athletic clothing |
|  | Other: |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Equipment Required:** | |  | |  | | Quantity Required | | Sizes Required  *(if applicable)* |
| **Diagnostic/Monitoring:** | |  | | Portable monitor | |  | |  |
|  | | Thermometer | |  | |  |
|  | | NIBP | |  | |  |
|  | | Defibrillator | |  | |  |
|  | | EKG | |  | |  |
|  | | CXR | |  | |  |
|  | | O2 saturation probe | |  | |  |
| **Airway:** | |  | | Bag valve mask | |  | |  |
|  | | Peak flow meter | |  | |  |
|  | | Nasal cannula | |  | |  |
|  | | Nebulizer | |  | |  |
|  | | Non-rebreather mask | |  | |  |
|  | | Mechanical ventilator | |  | |  |
|  | | Oropharyngeal airway | |  | |  |
|  | | Nasopharyngeal airway | |  | |  |
|  | | Non-invasive positive pressure ventilation | |  | |  |
|  | | Laryngoscope | |  | |  |
|  | | Endotracheal tube | |  | |  |
|  | | Syringe | |  | |  |
|  | | Stylet | |  | |  |
|  | | End tidal CO2 detector (colorimetric) | |  | |  |
|  | | End tidal CO2 detector (capnographic) | |  | |  |
|  | | Bougie | |  | |  |
|  | | Glidescope | |  | |  |
| **Vascular access:** | |  | | Peripheral IV | |  | |  |
|  | | Arterial line | |  | |  |
|  | | Central line | |  | |  |
|  | | PICC line | |  | |  |
|  | | Swan Ganz catheter | |  | |  |
|  | | Dialysis catheter | |  | |  |
| **Resuscitation:** | |  | | Crash cart | |  | |  |
|  | | Trauma cart | |  | |  |
|  | | Difficult airway cart | |  | |  |
|  | | Cricothyrotomy tray | |  | |  |
|  | | Chest tube tray | |  | |  |
|  | | Pericardiocentesis tray | |  | |  |
|  | | Chest tube tray | |  | |  |
|  | | Urinary catheter tray | |  | |  |
| **Other:** | |  | |  | |  | |  |
| **Fluids and Drugs** |  | |  | | Volume, Concentration or Dose Required | | Number of Units Required | |
| **IV Fluids:** |  | | NS | |  | |  | |
|  | | 0.45% NS | |  | |  | |
|  | | 3% NS | |  | |  | |
|  | | 2/3 1/3 NS | |  | |  | |
|  | | D5W | |  | |  | |
|  | | D5 ½ NS | |  | |  | |
|  | | Ringer’s lactate | |  | |  | |
|  | | Pentaspan | |  | |  | |
|  | | Other: | |  | |  | |
| **Blood products:** |  | | 25% albumin | |  | |  | |
|  | | 5% albumin | |  | |  | |
|  | | pRBC’s | |  | |  | |
|  | | Platelets | |  | |  | |
|  | | Fresh Frozen Plasma | |  | |  | |
|  | | Cryoprecipitate | |  | |  | |
|  | | Factor VIII concentrate | |  | |  | |
|  | | Factor IX concentrate | |  | |  | |
|  | | Other: | |  | |  | |
| **Pre-filled drugs:** |  | | D50W | |  | |  | |
|  | | Epinephrine | |  | |  | |
|  | | Bicarbonate | |  | |  | |
|  | | Calcium chloride | |  | |  | |
|  | | Lidocaine | |  | |  | |
|  | | Atropine | |  | |  | |
|  | | Adenosine | |  | |  | |
|  | | Other: Calcium Gluconate 10% | | 100 mL | | 3 | |
| **Other drugs:** |  | | Fentanyl | |  | |  | |
|  | | Midazolam | |  | |  | |
|  | | Propofol | |  | |  | |
|  | | Etomidate | |  | |  | |
|  | | Ketamine | |  | |  | |
|  | | Succinylcholine | |  | |  | |
|  | | Roccuronium | |  | |  | |
|  | | Glucagon | |  | |  | |
|  | | Digoxin | |  | |  | |
|  | | Lasix | |  | |  | |
|  | | Nitrogylcerin | |  | |  | |
|  | | Labetelol | |  | |  | |
|  | | Other: | |  | |  | |

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| **Audiovisual Needs:** |  |
| **Imaging:** | *(link to x-rays, CT scans, ultrasounds, MRI’s)* |
| **Bloodwork:** | *(link to bloodwork here)* |
| **EKG’s:** | *(link to EKG’s here)* |
| **Short didactic presentation:** | *(link to short presentation here – max 5 minutes)* |
| **Handouts:** | *(link to handouts here)* |
| **Simulator exercise file:** | *(link to simulator exercise file here)* |
| **References:** |  |
| **Required reading:** | *(link to required reading here)* |

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| **Debriefing points:** |  |
| * **Knowledge** | *Link from objectives* |
| * **Skills** | *Link from objectives* |
| * **Behaviour** | *Link from objectives* |

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| **Assessment:** |  | | | | |
| * **Knowledge**   + Objective 1   + Objective 2   + Objective 3 | 1  1  1 | 2  2  2 | 3  3  3 | 4  4  4 | 5  5  5 |
| * **Psychomotor**   + Objective 1   + Objective 2   + Objective 3 | 1  1  1 | 2  2  2 | 3  3  3 | 4  4  4 | 5  5  5 |
| * **Behaviour**   + Objective 1   + Objective 2   + Objective 3 | 1  1  1 | 2  2  2 | 3  3  3 | 4  4  4 | 5  5  5 |
| **Global performance:** | 1 | 2 | 3 | 4 | 5 |
| * **Critical action:** |  | | | | |
| * **Critical errors:** |  | | | | |
| * **Participants’ evaluation:** | *Link to evaluation for the session to be filled out by the participants* | | | | |