**Section 1: Case Summary**

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| **S****cenario Title:** |  |
| Keywords: | pesticides, organophosphate poisoning, contamination, decontamination, symptom management |
| Brief Description of Case: | A patient will be brought in by Ambulance for respiratory distress. On route to hospital, EHS becomes aware that the patient was in contact with pesticides. Symptoms are consistent with organophosphate poisoning, and the patient is considered to be internally and externally contaminated. The participants will need to don appropriate PPE and decontaminate the patient. The patient will begin to deteriorate with worsening bradycardia and respiratory distress. The participants will be required to manage symptoms and intubate the patient. Upon administration of the antidote, the patient’s status will begin to stabilize and the scenario will conclude. |

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| **Goals and Objectives** | |
| Simulation Session Goal: |  |
| Objectives:  (Medical and CRM) | 1. Recognition of organophosphate poisoning 2. Describe the signs and symptoms of organophosphate poisoning 3. Describe the importance of decontamination and utilize appropriate PPE when there is a possibility of organophosphate poisoning 4. Management of bradycardia in the setting of organophosphate poisoning 5. Describe antidotes for organophosphate poisoning and the correct dosing |

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| **Learners, Setting and Personnel** | | | | | | |
| Target Learners: | Junior Learners | | Senior Learners | | | Staff |
| Physicians | Nurses | | RTs | Inter-professional | |
| Other Learners: | | | | | |
| Location: | Sim Lab | | In Situ | | | Other: |
| Recommended Number of Facilitators: | Instructor/Facilitator: 1 | | | | | |
| Confederates: | | | | | |
| Sim Techs: 1 | | | | | |

**Section 2A: Initial Patient Information**

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| 1. **Patient Chart** | | | | |
| Patient Name: Nicholas Ye | | Age:32 | Gender : M | Weight: 74kg |
| MOST status: FULL CODE | | Infection Control Precautions: | | |
| Presenting complaint: Respiratory Distress | | | | |
| You receive a pre-notification from EHS stating that they are bringing in a 32 year old male with acute altered LOC and respiratory distress. The patient is actively vomiting.  The crew reports that they just received a call from their supervisor who is still on scene informing them that the patient, who is an employee at a farm, was recently applying pesticides and working within a closed storage building that holds various chemicals. The supervisor is concerned about exposure and is suggesting to you to prepare for decontamination when the patient arrives. | | | | |
| Allergies: NKDA | | | | |
| Past Medical History:  None | Current Medications:    None | | | |
| Family/Social History:  Does not smoke or drink alcohol  No illicit drug use | | | | |

**Section 2B: Confederate**

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

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| **A. Patient** |
| Mannequin |
| Standardized Patient |
| Task Trainer |
| Hybrid |
| **B. Special Equipment Required** |
| *\*From WPH: Decon PPE\**  Crash Cart |
| **C. Required Medications** |
| Atropine  Pralidoxine  RSI meds |
| **D. Initial Patient Set-up & Moulage** |
| IV drainage bag with attached tubing  IV setup of \_\_\_\_\_\_\_\_ and infusing @­\_\_\_\_\_\_\_ |
| **E. Monitors at Case Onset** |
| Patient on monitor with vitals displayed  Patient not yet on monitor |
| **F. Patient Reactions and Exam** |
| *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.*  *Weakness*  *Nausea/Vomitting, excessive salivation*  *Tremor*  *Headache, Dizziness, Blurry vision*  *Abdo pain/cramping*  *Sweating*  *SOB due to bronchospasm and possibly bronchorrhea* |

**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 |
| Phase 1: Decontamination | *Not arrived* | Organize team roles/responsibilities  Don PPE appropriately  Contact Poison Control |  | | Poison Control states will send over information for organophosphate poisoning (if called in this phase) |
| **Phase 2: Presentation**  Rhythm: Sinus Brady  HR: 45  BP: 90/60  RR: 25  O2SAT: 89%  T: 36.6  Blood Sugar: 6.7  GCS: 14 | *A – patent, excessive saliva*  *B – mild resp distress, wheezes*  *C – bradycardic, regular*  *D – constricted pupils, confused, diaphoretic*  *E – No C/C/E*  *Pt repeats “I feel sick, I’m going to vomit”* | Expected Learner Actions  Collect appropriate history  Recognize organophosphate poisoning  Decontaminate patient appropriately (outside – patient to not come inside until decontaminated by EHS bay)  Place patient on monitor  Provide high flow O2  Order labs, CXR, ECG  Contact Poison Control | | **Modifier**s  Supplemental O2: SpO2 increases to 92%  **Triggers**  Completion of initial assessment and application of supplemental oxygen, move to Phase 3 | If called in Phase 2, Poison Control states will send over information for organophosphate poisoning  Provide ECG (if asked)  Provide CXR (if asked) |
| **Phase 3: Deterioration**  Rhythm: Brady  HR: 35  BP: 80/40  RR: 45  O2SAT: 84%  T: 36.0  Blood Sugar: 6.1  GCS: 9 | *B – Severe salivary secretions,*  *tachypneic, rales*  *C – same*  *D – eyes closed, unable to follow commands, occasional mumbling* | Expected Learner Actions  Identify worsening mental and respiratory status  Administer atropine  Administer pralidoxime as antidote  Perform intubation  Consult ICU | | Modifiers  Triggers  Completion of intubation and consult with ICU, END SCENARIO | Can provide labs if requested in previous phase |

**Recognition of S&S of organophosphate poisoning:**

Organophosphate compounds inhibit acetylcholinesterase on red cell membranes, and butyrylcholinesterasein plasma. Acetylcholinesterase blockade leads to a build up of acetylcholine in the synapses and overstimulation of acetylcholine receptors. This is responsible for the clinical effects of the toxin. 2  Acutely, patients exhibit signs of cholinergic excess, namely respiratory depression, excess secretions, bradycardia, diarrhea, urination, miosis, emesis, lacrimation, altered mental status, confusion, lethargy, seizures, and coma.4  A common and helpful pneumonic to remember the symptoms of the cholinergic toxidrome is SLUDGE:

Salivation

Lacrimation

Urination

Defecation

Gastrointestinal upset

Emesis

**Management of bradycardia in setting of organophosphate poisoning:**

Atropine should be given to patients with signs of cholinergic toxicity. Atropine is an anti-cholinergic drug that blocks acetylcholine at the muscarinic receptor. While atropine is a treatment for bradycardia, it should be titrated to the resolution of bronchorrhea and not the heart rate. It should also be noted that patients may require large doses of atropine.4 You can start with 0.5-2mg IV and double the dose every five minutes until secretions and wheezing have decreased.

**Know and understand the antidote to organophosphate poisoning:**

Pralidoxime (2-PAM) is the antidote used to treat organophosphate poisoning and should be given in any patient that requires atropine for treatment.4  Acetylcholine is a neurotransmitter that is broken down by acetylcholinesterase and is primarily found at the neuromuscular junctions. Organophosphate compounds inactive this enzyme leading to decreased destruction of acetycholine and an excess of this neurotransmitter. This causes the cholinergic toxidrome seen in organophosphate toxicity. Pralidoxime works by resversibly binding to the acetylcholinesterase enzyme thereby competing with the organophosphate binding. Unlike organophosphates, Pralidoxime does not inactivate the enzyme and so allows it to still function. Response to the antidote may vary depending on the specific pesticide in question.2 Pralidoxime should be given as early as possible in the patients ED Course to prevent permanent inactivation of the enzyme (“aging”).

It is also important to note that activated charcoal will bind organophosphates well if they are orally ingested. One can also consider nasogastric tube aspiration if the patient is awake and alert and protecting their airway.

**Understand the importance of decontamination and PPE for staff:**

As stated above, organophosphates are rapidly absorbed through the skin, respiratory tract, and GI tract. Therefore, it is important for any persons coming in contact with the patient to be in personal protective gear. Providers should consider multiple layers of gloves. Organophosphates can penetrate latex but cannot penetrate rubber butyl gloves. It is also important for the patient to be decontaminated as quickly and as safely as possibly.

**References**

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