

SECTION: R-5

PROTOCOL TITLE: Organophosphate/Carbamate/Nerve Agent Exposure

REVISED: September 30, 2010

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**GENERAL COMMENTS:** *This protocol covers organophosphate, carbamates and nerve agent poisonings.*

**BLS SPECIFIC CARE:** *See adult General Toxicological Care Protocol R-1*

- Scene Safety:
  - Take Personal Protective Precautions
  - Request HAZMAT/HAZMED if any risk of provider contamination
- Remove patient's clothes and soap/water decontamination at a minimum.
- Oxygenation: Supplemental oxygen as needed
- If pediatric patient, determine patient's color category on length based resuscitation tape (Broselow Tape)
- Attempt to identify offending agent if safety permits

**ILS SPECIFIC CARE:** *See adult General Toxicological Care Protocol R-1*

- Use Metriset administration set on medical patients less than 8 years of age

**ALS SPECIFIC CARE:** *See adult General Toxicological Care Protocol R-1*

*Antimuscarinic*

- Atropine: Repeat as necessary until drying of secretions noted. No maximum dose.
  - ♦ Adult:
    - IV/IO/IM: 1-2 mg
    - ETT: 2-4 mg
  - ♦ Pediatric:
    - IV/IO/IM: 0.05 mg/kg
    - ETT: 0.03 mg/kg

*Bronchodilators:*

- ♦ Adult and pediatric:
  - For first treatment, combine one albuterol (2.5 mg/3 ml) nebu­le and one Atrovent (0.5 mg/2.5 ml) nebu­le in reservoir of oxygen driven nebulizer unit and administer at 10 LPM

- If Atrovent is contraindicated, use 2 albuterol nebulas (one for pediatric patients) for first treatment.
- Repeat as needed with albuterol treatments only

*Anticonvulsants:*

For severe signs and symptoms and/or seizure activity associated with nerve agent, organophosphate or carbamate exposure/ingestion.

- Valium (diazepam IV/IO/PR/IM)
  - ♦ Adult:
    - IV/IO: 2-10 mg every 5-10 minutes as needed to a maximum of 20 mg
    - PR/IM: 5-10 mg every 5-10 minutes as needed to a maximum of 20 mg
  - ♦ Pediatric:
    - IV/IO: 0.1-0.2 mg/kg every 5 minutes as needed to a maximum total dose of 10 mg
    - PR/IM: 0.5 mg every 5 minutes as needed to a maximum total dose of 10 mg
- Versed (midazolam) IV/IO/IN/IM
  - ♦ Adult:
    - IV/IO: 0.5-2.5 mg every 5-10 minutes as needed to a maximum of 5 mg
    - IN (intranasal): 5mg (2.5 mg each nare) to a maximum total dose 5 mg
    - IM: 5mg to maximum dose 5 mg
  - ♦ Pediatric:
    - IV/IO/IM: 0.05-0.2 mg/kg every 5-10 minutes as needed to a maximum total dose of 10 mg
    - IN/PR: 0.2-0.4 mg/kg every 5 minutes as needed to a maximum total dose of 5 mg

- **Auto-Injectors:**

*DuoDote Auto-Injector:* (ATNAA: Antidote Treatment Nerve Agent Auto-Injector)\*

- 2.1 mg atropine in 0.7 ml and 600 mg pralidoxime chloride in 2 ml delivered intramuscularly through a single needle

- For patients exhibiting mild to severe signs and symptoms of nerve agent or organophosphate poisoning
- ♦ Adult:
  - For mild cases of exposure/ingestion:
    - Administer 1 auto-injector
    - If, after 10-15 minutes, severe symptoms do not develop, no additional treatment is required
  - If, at any time after the first dose, severe symptoms develop, rapidly administer 2 more auto-injectors.
- For severe cases of exposure/ingestion:
  - Administer 3 auto-injectors in rapid succession
  - No more than 3 auto-injectors should be administered to any one patient

**PHYSICIAN PEARLS:** Organophosphates irreversibly bind to cholinesterase, causing the phosphorylation and deactivation of acetylcholinesterase. The accumulation of acetylcholine at the neural synapse causes an initial overstimulation, followed by exhaustion and disruption of postsynaptic neural transmission in the central nervous system (CNS) and peripheral nervous systems (PNS). If the organophosphate /cholinesterase bond is not broken by pharmacologic intervention within 24 hours, large amounts of cholinesterase are destroyed, causing long-term morbidity or death. Carbamate poisoning exhibits a similar clinical picture to organophosphate toxicity. However, unlike organophosphates, carbamate compounds temporarily bind cholinesterase for approximately 6 hours with no permanent damage. Carbamates have poor CNS penetration and cause minimal CNS symptoms. Administer both the Atropine AND the 2-Pam to symptomatic patients with organophosphate exposure. 2-Pam is not necessary for KNOWN/ ISOLATED carbamate exposure. While pulmonary edema may occur, Lasix is generally ineffective and not indicated.

*Decontamination and containment*

- Separate patient from causative agent. Most exposures are to liquid solutions; decon hair and folds of skin. Decon for at least 15 minutes with water and detergent.
- Decontamination takes precedence over ALS interventions.
- Decontamination should be done by qualified personnel.
- Clothes should be removed on scene, bagged by personnel wearing appropriate equipment, and left for appropriate disposal. **DO NOT** transport in ambulance or to hospital where they may contaminate other providers.
- Patient should be transported in a "patient envelope" or similar device.

*Mnemonics for nerve agent/organophosphate/Carbamate exposure*

Protocol

R-5

**ORGANOPHOSPHATE EXPOSURE**

<p><b>“S.L.U.D.G.E.”</b></p> <p>Salivation (excessive production of saliva) Lacrimation (excessive tearing) Urination (uncontrolled urine production) Defecation (uncontrolled bowel movement) Gastrointestinal distress (cramps) Emesis (excessive vomiting)</p>	<p><b>“D.U.M.B.E.L.S.” (Muscarinic)</b></p> <p>Diarrhea Urination Miosis Bradycardia/Bronchospasm/Bronchorrhea Emesis Lacrimation Salivation, Secretion, Sweating</p>
<p><b>“B.A.M.”</b></p> <p>Breathing Difficulty (wheezing) Arrhythmias (Bradycardia, ventr. Arrhythmias, AV Blocks. ) Miosis (pinpoint pupils)</p>	<p><b>Days of the Week (Nicotenic)</b></p> <p>Mydriasis Tachycardia Weakness Hypertension, Hyperglycemia Fasciculations</p>
<p><b>“Three C’s” of CNS effects</b></p> <p>Confusion Convulsions Coma</p>	