



EMS Information Bulletin- #5

DATE: August 13, 2003

SUBJECT: Antidotes for Agents of Chemical Terrorism

TO: Regional EMS Medical Directors
Regional Counterterrorism Task Force Leaders
Ambulance Services
Poison Centers

FROM: Emergency Medical Services Office
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The following information was distributed to the Regional EMS Councils Directors; Regional EMS Medical Directors, Regional Counterterrorism Task Force Leaders, PEMA, Poison Centers and State Fire Commissioner's Office on May 21, 2003.

The Department of Health and Human Services (HHS) recently made recommendations related to the use of nerve agent and cyanide antidotes by EMS systems. It is important for Pennsylvania's EMS providers to have the authority to carry and use these antidotes when the need has been recognized and the regional protocols permit such use.

Pralidoxime (2-PAM) is an antidote for certain nerve agents and, along with atropine, is a component of the Mark 1 autoinjector kits that may now be used by ALS personnel. Sodium thiosulfate is used to treat cyanide poisoning and is a component of cyanide kits. At this time, sodium thiosulfate is the only component of the cyanide kit approved in response to the HHS recommendation. The following information is provided to regional EMS councils to assist with decision making related to the use of these antidotes:

1) Are ALS personnel permitted to use these medications?

Effective immediately, pralidoxime and sodium thiosulfate are approved as exceptions to the ALS drug list. ALS services may carry and use these medications if permitted to do so by the regional ALS treatment protocols. This exception is in effect until these medications are added to the State ALS drug list and published in the Pennsylvania Bulletin.

2) What medications are administered to patients who have symptoms related to exposure to a nerve agent or cyanide?

Atropine and **pralidoxime** are the initial treatments for patients with symptoms of a nerve agent exposure. These may be given as individual injections, but they are also conveniently packaged in autoinjectors known as Mark 1 kits. Generally, one Mark 1 kit is used to treat mild or moderate symptoms and 3 kits are used for moderate to severe symptoms. **Diazepam** is used to treat or prevent seizures in these patients. Diazepam may be carried in vials or in autoinjectors known as CANA. **Sodium thiosulfate** is used to treat patients with symptoms that may be related to exposure to cyanide.

3) Which ALS service should carry these medications?

Threat assessment is the basis for answering this question. All regions and RCTTFs were part of the PA Domestic Preparedness Strategy (threat assessment) completed in September 2001. These assessments may need updating. Regional EMS councils and RCTTFs must be involved in the assessment of the need for carrying these antidotes in forward responding units, the amount of antidotes that should be stored, and the location of any caches. All use of these medications must be consistent with the regional EMS treatment protocols. All medications must be stored and maintained in compliance with the EMS Act and regulations and other laws pertaining to the storage, maintenance and security of medications.

ALS services that cover municipalities with populations over 50,000 or mass gathering events with over 50,000 attendees should consider carrying these antidotes in forward responding EMS units. ALS services that cover smaller populations should consider alternatives that would provide access to these medications if needed. Examples include storing prepackaged caches at a local hospital so that the medications can be picked up by a responding unit or storing prepackaged caches at air ambulance bases so that the medications can be transported to a scene when needed. These alternatives should be planned in collaboration with regional EMS councils and RCTTFs to assure minimum duplication and maximum coordination.

4) How should these medications be incorporated into regional EMS protocols?

Regions that wish to incorporate antidote protocols should use these protocols. Regional EMS councils that incorporate these exact protocols can consider the protocols approved as regional protocols without further review from the Department. However, regional EMS councils are requested to inform the EMS Office if the region adds the protocols to its regional treatment protocols.

5) How should ALS practitioners be trained to use these medications?

The EMS Office is developing a continuing education program for the use of these antidotes. This will be completed urgently. The course will be completed as a traditional CE lecture and via the Learning Management System.

**Attachments: CYANIDE COMPOUND EXPOSURE PROTOCOL
NERVE AGENT/PESTICIDE EXPOSURE PROTOCOL**

CYANIDE COMPOUND EXPOSURE

CRITERIA:

- A. Patients experiencing symptoms after suspected exposure to cyanide or cyanogen chloride:
 - 1. Serious exposure: symptoms include unconsciousness, seizures, and apnea. The skin may be bright red.
 - 2. Moderate exposure: symptoms may include dizziness, nausea, weakness, eye/throat irritation, and giddiness.

EXCLUSION CRITERIA:

- A. Patients with suspected exposure, but without symptoms, should be evaluated for decontamination but do not require further medical treatment.
- B. If patients are seizing and have pinpoint pupils, excessive nasal/oral secretions, or muscle fasciculation (rippling tremors under skin), EMS personnel should consider exposure to nerve agents (See Nerve Agent Protocol).

SYSTEM REQUIREMENTS:

- A. Sodium thiosulfate may be carried by ALS ambulance services if the medication is permitted by the regional treatment protocols. The service must report the amount carried to the regional EMS council, and the regional EMS council should coordinate the stocks of antidote with the regional counterterrorism task forces.
- B. Until the patient has been properly decontaminated, all EMS personnel who treat patients of suspected exposure to cyanide compounds should use Level B PPE. Level B PPE should only be used by personnel with appropriate training.

PROCEDURE:

A. All Patients:

- 1. Scene Safety. Only personnel in Level B PPE should treat patients before decontamination.
- 2. Decontaminate patient. If possible, treatment of patients with severe exposure should begin during decontamination.
- 3. Perform patient assessment.
 - a. Pulsoximetry may be inaccurate and should be avoided.
- 4. Administer Oxygen at 15 lpm via NRB mask, assist ventilation/ intubate if necessary.¹

B. Adult Patient with decreased LOC, seizures, or apnea:

- 5. Initiate IV NSS, macro drip, KVO.¹
- 6. Administer: Sodium Thiosulfate: 12.5 grams (50 ml.) IV over 1-2 minutes.²
- 7. Monitor ECG, if available.

C. Pediatric Patient with decreased LOC, seizures, or apnea:

- 5. Initiate IV NSS, macro drip, KVO.¹
- 6. Administer: Sodium Thiosulfate: 1.6 ml/kg, Maximum dose of 12.5 grams.²
- 7. Monitor ECG, if available.

D. All Patients:

- 8. Contact Medical Command: Possible medical command orders include:
 - i. Additional sodium thiosulfate
 - ii. Sodium bicarbonate to treat acidosis

NOTES:

1. In mass casualty incidents, oxygen and intravenous access should be prioritized to patients with symptoms of serious exposure if resources are limited.
2. May repeat sodium thiosulfate with half of initial dose once if symptoms persist after 5-10 minutes.

Performance Parameters:

- A. Every case of suspected cyanide compound exposure with any symptoms should receive QI review for appropriate use of oxygen and sodium thiosulfate.

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NERVE AGENT / PESTICIDE EXPOSURE

CRITERIA:

- A. Patients experiencing symptoms after suspected exposure to:
Nerve Agents (Tabun, Sarin, Soman, VX) **or**
Organophosphate (Malathion, Parathion) / carbamate (Sevin) pesticides.
1. Mild symptoms include:
 - i. Pinpoint pupils
 - ii. Runny nose
 2. Moderate symptoms include:
 - i. Mild shortness of breath/ wheezing
 - ii. Vomiting
 - iii. Diarrhea
 - iv. Muscle twitching or sweating at site of exposure
 3. Severe symptoms include:
 - i. Seizures
 - ii. Severe shortness of breath
 - iii. Apnea
 - iv. Unconsciousness

EXCLUSION CRITERIA:

- A. Patients with suspected exposure, but without symptoms, should be decontaminated as appropriate, but do not require further medical treatment.
- B. If patients are seizing and **do not** have pinpoint pupils, excessive nasal/oral secretions, or muscle fasciculation (rippling tremors under skin), EMS personnel should consider exposure to cyanide (See Cyanide Protocol).

SYSTEM REQUIREMENTS:

- A. Nerve agent antidote auto-injectors (MARK 1 kits)¹ and pralidoxime chloride (2-PAMCl) may be carried by ALS ambulance services if the medication is permitted by the regional treatment protocols. The service must report the amount carried to the regional EMS council, and the regional EMS council should coordinate the stocks of antidote with the regional counterterrorism task forces.
- B. Until the patient has been properly decontaminated, all EMS personnel who treat patients of suspected exposure to nerve agents should use Level B PPE. Level B PPE should only be used by personnel with appropriate training.
- C. EMTs, who have completed Department approved BLS MARK 1 kit auto-injector training, may administer MARK 1 kits under the supervision of an on-scene paramedic after the paramedic has assessed the patient and determined the number of MARK 1 kits to be administered.

PROCEDURE:

- A. **All Patients:**
1. Scene safety. Only personnel in appropriate PPE should treat patients prior to decontamination.
 2. Decontaminate patient. If possible, treatment of patients with severe symptoms should begin during decontamination.
 3. Perform patient assessment.
 4. Administer Oxygen at 15 lpm via NRB mask, assist ventilation / intubate if necessary.^{2, 3}

B. All Patients with Mild symptoms:

5. Complete decontamination as indicated.
6. Reassess for signs of worsening symptoms.

C. Adult Patients with Moderate symptoms:

5. Administer 1 **MARK I kit**^{4, 5, 6}. Repeat after 5 minutes if no improvement in shortness of breath/ wheezing.
6. Monitor ECG and pulsoximetry, if available.²
7. Initiate IV NSS KVO.²

D. Adult Patients with Severe symptoms:

5. Administer 3 **MARK I kits**^{4, 5, 6}
6. Initiate IV NSS KVO.²
7. Administer diazepam.⁷
 - If seizing, diazepam 10 mg IV slowly.
 - If not seizing, diazepam 10 mg IM or by CANA auto-injector.
8. Monitor ECG and pulsoximetry, if available.²

E. Pediatric Patients with Moderate symptoms:

5. Complete decontamination as indicated.
6. Monitor ECG and pulsoximetry, if available.²
7. Initiate IV NSS KVO.²
8. Reassess for signs of worsening symptoms.

F. Pediatric Patients with Severe symptoms:

5. **Children 2-7 years old:** Administer 1 **MARK I kit**^{4, 5, 6}
6. **Children 8-14 years old:** Administer 2 **MARK I kits**^{4, 5, 6}
7. Initiate IV / IO NSS KVO.²
8. If severe symptoms, administer diazepam.⁷
 - If seizing, diazepam 0.3 mg/kg IV/ IO or 0.5 mg/kg PR (maximum dose 10 mg).
 - If not seizing, diazepam 0.3 mg/kg IM (maximum dose 10 mg).
9. Monitor ECG and pulsoximetry, if available.²

G. All Patients:

10. Contact Medical Command. Possible medical command orders include:
 - a. Administer additional MARK 1 kits.
 - b. Administer atropine IM or IV (pediatrics 0.05 mg/kg IM, IV, or IO). Consider repeating every 5 minutes as needed.
 - c. Administer pralidoxime intravenously over 30 minutes (adults 1 gm; pediatrics 15 mg/kg). May lead to severe and prolonged hypertension if given too rapidly.

NOTES:

1. A MARK 1 kit has two auto-injectors; one contains 2 mg atropine and one contains 600 mg pralidoxime chloride (2-PAMCl).
2. In mass casualty incidents, oxygen, intravenous access, pulsoximetry monitoring, and ECG monitoring should be prioritized to patients with severe symptoms if resources are limited.
3. Due to severe bronchoconstriction and secretions, ventilation may be difficult, therefore atropine should be administered before attempts to intubate patient.
4. Do not administer pralidoxime (2-PAMCl) to patients with exposure to carbamate pesticide (Sevin).
5. If Mark 1 kits are not available, alternatively administer:
 - a. 2 mg atropine IV and 600 mg pralidoxime IM as a substitute for each MARK 1 kit.
 - b. atropine should be administered prior to pralidoxime.

- c. **Mark I kits are not recommended for children under 2 years old**, and medical command may order alternative IM, IV, or IO medications in these situations.
6. **Use of the MARK I kit:**
- a. The **MARK I kit** contains two auto injectors. The first auto injector contains 2 mg of atropine which is administered IM by pressing the end of the device onto the thigh or buttocks. The second auto injector contains 600 mg. of pralidoxime chloride (2-PAM) and is administered the same way as the atropine.
 - 1) Remove the Nerve Agent Antidote Kit (**MARK I kit**) from its storage location.
 - 2) With your non-dominant hand, hold the auto injectors by the plastic clip so that the larger auto injector is on top and both are positioned in front of you at eye level.
 - 3) With the other hand check the injection site (lateral thigh muscle) for buttons or objects in the pockets which may interfere with the injections.
 - 4) Grasp the atropine (green-tipped) auto injector with the thumb and first two fingers.
Atropine doses should all be administered prior to the administration of 2-PAM.
 - 5) Pull the injector out of the clip with a smooth motion.
 - 6) Hold the auto injector like a pen or pencil, between the thumb and first two fingers.
 - 7) Position the green tip of the auto injector against the injection site.
 - 8) Apply firm, even pressure (not a jabbing motion) to the injector until it pushes the needle into the lateral thigh muscle.
 - 9) Hold the injector firmly in place for at least 10 seconds.
 - 10) Carefully remove the auto injector.
 - 11) Place the used auto injector into a sharps container.
 - 12) Pull the 2-PAM auto injector (black tipped) out of the clip and inject using the procedures outlined in steps 4 through 11.
 - 13) Annotate the number of auto injectors administered on your patient care report or (in a mass casualty incident) on the triage tag.
7. Alternatively, may administer:
- a. lorazepam IV / IO slowly or IM (4 mg for adults; 0.1 mg/kg (maximum 4 mg) for children) or
 - b. midazolam IV / IO slowly or IM (5 mg for adults; 0.15 mg/kg (maximum 5 mg) for children). If actively seizing without IV access, IM midazolam may be preferred over PR diazepam.

Performance Parameters:

- A. Every case of suspected nerve agent or pesticide exposure with any symptoms should receive QI review for appropriate use of antidotes.