



## **Revised Recommendations for Medical Providers regarding Chemical Terrorism**

**Please distribute to colleagues in Critical Care,  
Emergency Medicine, Internal Medicine, Laboratory Medicine,  
Neurology, and Toxicology**

March 6, 2003

The Chemical Terrorism Alert originally sent to all Emergency Departments on February 14, 2003 has been revised to incorporate more detailed treatment information as well as cold weather decontamination guidelines. *This revision does not represent any heightened alert.* With respect to the risk of chemical terrorism, the Michigan Department of Community Health<sup>1</sup> requests that you:

- Be alert for:
  - An unusual increase in the number of people seeking care, especially with respiratory, neurological, gastrointestinal or dermatological symptoms
  - Any clustering of symptoms or unusual age distribution (e.g., chemical exposure in children)
  - Any unusual clustering of patients in time or location (e.g. persons who attended the same public event)
  - Unexplained deaths in young or healthy people

If any of these situations arise immediately contact the Poison Control Center at (800) 222-1222, notify your local health department, and your local police agency. If required, the FBI will be requested by the police agencies.

- Proper decontamination is the most important first step in treating a patient suspected of exposure to a chemical agent. unless the patient has a life threatening condition, at which time simultaneous treatment and decontamination would need to occur. This involves prompt removal of clothing and washing with water and, if available, soap.

---

<sup>1</sup> Information in this health alert is adapted from an alert distributed by the New York City Department of Health on March 4, 2003.

- If chemical exposure is suspected, emergency medical personnel must use appropriate personal protective equipment including skin and respiratory protection where indicated.
- Antidotes are available for cyanides and nerve agents.

***The information in this alert is only a summary. For more detail on medical treatment, review the resources at the end of this alert.***

## **DECONTAMINATION GUIDELINES**

Proper decontamination is the most important first step in treating a patient exposed to chemical agents. Immediate removal of patient clothing can remove up to 90 percent of the contaminant. Clothing should not be pulled over the head; clothing should be cut off if possible. Removed clothing should be bagged, sealed and retained as possible evidence and for proper treatment and/or disposal. After the clothing is removed, the patient's skin and eyes may need to be decontaminated. In most cases, decontamination of skin can be accomplished by gentle and thorough washing with water, and soap if available. Remove contact lenses if easily removable without additional trauma to the eye. Rinse eyes with plain water or normal saline for 10-15 minutes. Water used for decontamination should to be contained, if possible.

Bleach solutions should not be used on people. Diluted bleach (1 part household bleach to 9 parts water) can be used on eyeglasses, equipment and other hard surfaces. Because bleach solutions irritate the eyes, skin and respiratory tract, they must be handled with caution and used with adequate ventilation.

It is important not to abrade the skin during washing or rinsing. This is especially true after exposure to blistering/vesicant agents that bind to skin. These agents may leave the skin compromised and susceptible to further damage. For choking/pulmonary-damaging agents or incapacitating/behavior-altering agents, a rinse in water alone may be adequate.

Victims whose clothing or skin is contaminated with hydrogen cyanide liquid or solutions can secondarily contaminate emergency personnel by direct contact or through off-gassing vapors. Avoid dermal contact with cyanide-contaminated victims or with the gastric contents of victims who may have ingested cyanide-containing materials. Victims exposed only to hydrogen cyanide gas do not pose contamination risks to rescuers.

### **Cold Weather Decontamination**

Although potentially life saving, outdoor wet-decontamination procedures during cold weather present risks that must be balanced against the hazards posed by chemical agents. Responders should use whatever resources are available and should select the fastest method, since immediate decontamination has greater efficacy.

Special populations such as the elderly and children should be given special consideration for limited resources such as blankets and indoor shelter because of their limited ability to maintain a normal body temperature.

- Outdoor temperature above 65°F
  - Remove clothes; decontaminate with copious water outdoors; move to post-decontamination area or shelter.
  
- Outdoor temperature 35-65°F
  - Remove clothes; decontaminate with copious water outdoors or in a heated enclosure (use warm water when ever possible); move to a post-decontamination area in a heated enclosure with a temperature above 65°F.
  - This can be arranged by setting up a decontamination corridor near the entranceway to a hospital or other facility, such as a hotel or school.
  
- Temperature below 35°F
  - Remove clothes at the earliest opportunity; dry decontamination techniques such as blotting the victim with paper towels, dirt, sand until victims are moved indoors for wet-decontamination.
  - Consider indoor showers, indoor swimming pools, and hospital decontamination areas.
  - If victims are transported prior to having wet-decontamination, they should have their clothing removed before transport.

## Special Considerations

**Cold Shock** refers to the physiological response triggered by sudden cold-water exposure and can result in sudden death. The risk is greatest for those with pre-existing medical conditions. Cold shock can be minimized by encouraging people to gradually get wet, rather than being suddenly deluged with cold water.

**Hypothermia**, a condition of deep body cooling, takes longer to develop than cold shock. Most people can tolerate 55°F water with minimal discomfort. Shivering is not a sign of alarm, but lack of shivering if an individual is cold and wet is an indication of hypothermia. The risk of hypothermia can be decreased by quickly moving victims to warm shelters, using heated water for decontamination, providing clothing or blankets after decontamination.

*The key to successful decontamination is to use the fastest method that causes the least harm and does the most good for the majority of the victims.*

## PERSONAL PROTECTIVE EQUIPMENT (PPE)

Emergency room staff should *immediately* contact their in-house environmental health and safety officer for specific hazard assessment and PPE recommendations to ensure consistency with the hospital's policies and procedures and to ensure their staff are properly protected.

### PPE to Prevent Inhalation Exposure

Protection from both vapors and particulates may be required if a chemical agent is being released. After release, protection from vapors is most important. Surgical and N-95 masks will

**not** protect against inhalation of vapors. Half-face and full-face respirators, with the appropriate canister, will provide good protection from vapors. These operate by negative pressure and must be fit tested for optimal protection. Powered, air-purifying respirators (PAPR) and self-contained breathing apparatus (SCBA) provide even greater protection and operate under positive pressure so that fit characteristics are less important. Where airborne concentrations cannot be reasonably estimated, the highest level of protection should be used.

### **PPE to Prevent Dermal Exposure**

Latex examination gloves provide little protection from most chemical agents and can cause allergies. Gloves made of Viton, nitrile, butyl or neoprene provide more protection. It is best to have a variety of gloves available. Double gloving may provide additional protection. Chemical-resistant aprons or suits can also prevent dermal exposure.

### **PPE to Prevent Eye Exposure**

Protective eyewear is required during decontamination to prevent splashing into eyes. Full-face negative pressure air purifying respirators, PAPRs and SCBAs will provide eye and facial protection from both splashes and vapors. If a half face respirator is worn, protective eyewear should be worn. Protective eyewear that is not splash and vapor proof, such as safety glasses or a face shield will not provide protection from chemical vapors.

### **ODORS**

Some chemical agents are accompanied by a characteristic odor that may provide a warning. However, after a while, people may become used to the chemical and no longer detect the smell. The chemical may still be present even if there is no detectable odor. The absence of a particular agent's characteristic odor does not necessarily indicate the absence of that agent.

### **HEALTH EFFECTS, DECONTAMINATION AND TREATMENT**

The following tables provide a summary of the health effects, decontamination methods and treatment (Table 1). Information on antidotes for nerve agents is provided in Table 2, and for cyanide in Table 3.

**Note: The information contained in this alert is not intended to provide comprehensive guidelines. Additional information and references should be utilized.**

**TABLE 1. RECOGNIZING AND DIAGNOSING HEALTH EFFECTS OF CHEMICAL TERRORISM, INCLUDING DECONTAMINATION AND TREATMENT**

Agent Type	Agent Names	Unique Characteristics	Initial Effects	Decontamination	Medical Interventions	Other Patient Considerations
<b>Nerve</b>	<ul style="list-style-type: none"> <li>• Cyclohexyl Sarin (GF)</li> <li>• Sarin (GB)</li> <li>• Soman (GD)</li> <li>• Tabun (GA)</li> <li>• VX</li> </ul>	<ul style="list-style-type: none"> <li>• Miosis (pinpoint pupils)</li> <li>• Copious secretions</li> <li>• Muscle twitching/fasciculations</li> </ul>	<ul style="list-style-type: none"> <li>• Miosis (pinpoint pupils)</li> <li>• Blurred/dim vision</li> <li>• Headache</li> <li>• Nausea, vomiting, diarrhea</li> <li>• Copious secretions/sweating</li> <li>• Muscle twitching/fasciculations</li> <li>• Breathing difficulty</li> <li>• Seizures</li> </ul>	<ul style="list-style-type: none"> <li>• Remove clothing immediately</li> <li>• Gently wash skin with soap and water</li> <li>• Do not abrade skin</li> <li>• For eyes, flush with plenty of water or normal saline</li> <li>• Bleach solutions should NOT be used on people; diluted bleach (1 part household bleach to 9 parts water) can be used on eyeglasses, equipment and other hard surfaces</li> </ul>	<ul style="list-style-type: none"> <li>• Atropine</li> <li>• Pralidoxime (2-PAM) chloride</li> <li>• Benzodiazepines should be used for seizures or agitation</li> </ul>	<ul style="list-style-type: none"> <li>• Onset of symptoms from dermal contact with liquid forms may be delayed</li> <li>• Repeated antidote administration may be necessary</li> <li>• In a true nerve agent exposure, Pralidoxime therapy should be continued for at least 24 hours.</li> </ul>
<b>Asphyxiant/Blood</b>	<ul style="list-style-type: none"> <li>• Arsine</li> <li>• Cyanogen chloride</li> <li>• Hydrogen cyanide</li> </ul>	<ul style="list-style-type: none"> <li>• Possible cherry red skin</li> </ul>	<ul style="list-style-type: none"> <li>• Confusion</li> <li>• Nausea</li> <li>• Patients may gasp for air, similar to asphyxiation but more abrupt onset</li> <li>• Seizures prior to death</li> </ul>	<ul style="list-style-type: none"> <li>• Remove clothing immediately</li> <li>• Gently wash skin with soap and water</li> <li>• Do not abrade skin</li> <li>• For eyes, flush with plenty of water or normal saline</li> </ul>	<ul style="list-style-type: none"> <li>• Rapid treatment with oxygen</li> <li>• For cyanide, use oxygen, sodium bicarbonate, and specific antidotes (such as nitrites and/or sodium thiosulfate)</li> </ul>	<ul style="list-style-type: none"> <li>• Arsine and cyanogen chloride may cause delayed pulmonary edema</li> <li>• Arsine causes massive hemolysis</li> </ul>
<b>Choking/Pulmonary damaging</b>	<ul style="list-style-type: none"> <li>• Chlorine</li> <li>• Hydrogen chloride</li> <li>• Nitrogen oxides</li> <li>• Phosgene</li> </ul>	<ul style="list-style-type: none"> <li>• Chlorine is a greenish-yellow gas with pungent odor</li> <li>• Phosgene gas smells like newly mown hay or grass</li> </ul>	<ul style="list-style-type: none"> <li>• Eye and skin irritation</li> <li>• Airway irritation</li> <li>• Dyspnea, cough</li> <li>• Sore throat</li> <li>• Chest tightness</li> </ul>	<ul style="list-style-type: none"> <li>• Remove clothing immediately</li> <li>• Gently wash skin with soap and water</li> <li>• Do not abrade skin</li> <li>• For eyes, flush with plenty of water or normal saline</li> </ul>	<ul style="list-style-type: none"> <li>• Fresh air, forced rest</li> <li>• If signs of respiratory distress are present, oxygen with or without positive airway pressure may be needed</li> <li>• Other supportive therapy, as needed</li> </ul>	<ul style="list-style-type: none"> <li>• May cause delayed pulmonary edema, from 12-24 hours, even following a symptom-free period that varies in duration with the amount inhaled</li> </ul>

**TABLE 1. (continued) RECOGNIZING AND DIAGNOSING HEALTH EFFECTS OF CHEMICAL TERRORISM; INCLUDING DECONTAMINATION AND TREATMENT RECOMMENDATIONS**

Agent Type	Agent Names	Unique Characteristics	Initial Effects	Decontamination	Medical Interventions	Other Patient Considerations
<b>Blistering/ Vesicant</b>	<ul style="list-style-type: none"> <li>• Mustard/Sulfur mustard (HD, H)</li> <li>• Mustard gas (H)</li> <li>• Nitrogen mustard (HN 1, HN 2, HN 3)</li> <li>• Lewisite (L)</li> <li>• Phosgene oxime (CX)</li> </ul>	<ul style="list-style-type: none"> <li>• Mustard (HD) has an odor like burning garlic or horseradish</li> <li>• Lewisite (L) has an odor like geranium</li> <li>• Phosgene oxime (CX) has a pepperish or pungent odor</li> </ul>	<ul style="list-style-type: none"> <li>• Severe irritation</li> <li>• Redness and blisters of the skin</li> <li>• Tearing, conjunctivitis, corneal damage</li> <li>• Mild respiratory distress to marked airway damage</li> <li>• May cause death</li> </ul>	<ul style="list-style-type: none"> <li>• Immediate decontamination is essential to minimize damage</li> <li>• Remove clothing immediately</li> <li>• Gently wash skin with soap and water</li> <li>• Do not abrade skin</li> <li>• For eyes, flush with plenty of water or normal saline</li> <li>• Bleach solutions should NOT be used on people; diluted bleach (1 part household bleach to 9 parts water) can be used on eyeglasses, equipment and other hard surfaces</li> </ul>	<ul style="list-style-type: none"> <li>• Immediately decontaminate skin</li> <li>• Flush eyes with water or normal saline for 10-15 minutes</li> <li>• Give oxygen if there is difficulty breathing</li> <li>• Supportive care</li> </ul>	<ul style="list-style-type: none"> <li>• Possible pulmonary edema</li> <li>• Sulfur mustard has an asymptomatic latent period</li> <li>• There is no antidote or treatment for mustard</li> <li>• Lewisite has immediate burning pain, blisters later</li> <li>• Specific antidote British Anti - Lewisite (BAL) may decrease <u>systemic</u> effects of Lewisite, but its availability is very limited</li> <li>• Phosgene oxime causes immediate pain</li> </ul>
<b>Incapacitating/ Behavior altering</b>	<ul style="list-style-type: none"> <li>• Agent 15/BZ</li> </ul>	<ul style="list-style-type: none"> <li>• May appear as mass drug intoxication with erratic behaviors, shared realistic and distinct hallucinations, disrobing and confusion; onset may be delayed (30 to 60 minutes) depending on the agent</li> <li>• Hyperthermia</li> <li>• Mydriasis (dilated pupils)</li> </ul>	<ul style="list-style-type: none"> <li>• Dry mouth and skin</li> <li>• Initial tachycardia</li> <li>• Altered consciousness, delusions, denial of illness, belligerence</li> <li>• Hyperthermia</li> <li>• Ataxia (lack of coordination)</li> <li>• Hallucinations</li> <li>• Mydriasis (dilated pupils)</li> </ul>	<ul style="list-style-type: none"> <li>• Remove clothing immediately</li> <li>• Gently wash skin with water or soap and water</li> <li>• Do not abrade skin</li> </ul>	<ul style="list-style-type: none"> <li>• Remove heavy clothing</li> <li>• Evaluate mental status</li> <li>• Use restraints as needed</li> <li>• Monitor core temperature carefully</li> <li>• Supportive care</li> <li>• Sedation with benzodiazepines may be required</li> </ul>	<ul style="list-style-type: none"> <li>• Hyperthermia and self-injury are largest risks</li> <li>• Hard to detect because it is an odorless and non-irritating substance</li> <li>• Possible serious arrhythmias</li> <li>• Specific antidote (physostigmine) may be considered</li> </ul>

**TABLE 2. ANTIDOTE RECOMMENDATIONS FOLLOWING EXPOSURE TO NERVE AGENTS**

Patient Age	Antidotes		Notes and Other Treatments
	Mild/Moderate Effects <sup>1</sup>	Severe Effects <sup>2</sup>	
<b>Infants (0-2 yrs)</b>	Atropine: 0.05 mg/kg IM, <b>or</b> 0.02 mg/kg IV with a minimum dose of 0.1mg  <b>and</b>  2-PAM Chloride: 25-50 mg/kg IM <b>or</b> IV slowly (over 20-30 minutes) diluted to 5% concentration or less with 0.9% normal saline (e.g. 50 mg/mL)	Atropine: 0.1 mg/kg IM, <b>or</b> 0.02 mg/kg IV;  <b>and</b>  2-PAM Chloride: 25-50 mg/kg IM, <b>or</b> IV slowly (over 20-30 minutes) diluted to 5% concentration or less with 0.9% normal saline (e.g. 50 mg/mL)	<ul style="list-style-type: none"> <li>• Assisted ventilation after antidotes for severe exposure.</li> <li>• Repeat atropine every 3-5 minutes.</li> <li>• Phentolamine for 2-PAM-induced hypertension: (5 mg IV for adults; 1 mg IV for children). May cause hypotension if given too fast. Infusion should be run over 5-10 minutes.</li> <li>• Diazepam for convulsions: (0.2 to 0.5 mg IV for infants less than 5 years; 1 mg IV for children 5 years and older; 5 mg IV for adults).</li> </ul> <p>*** NOTE THAT TREATMENT CAN DIFFER DEPENDING ON THE AVAILABILITY OF MARK I KITS VS. IV ACCESS: ***</p> <p><b>(1) IF ONLY MARK I KITS ARE AVAILABLE:</b></p> <p><b>Atropine:</b></p> <ul style="list-style-type: none"> <li>• Mark I autoinjectors contain 2 mg of atropine each.</li> <li>• Adults should be given one injection intramuscularly every 2-5 minutes until pulmonary secretions are dry.</li> <li>• Tachycardia and dilated pupils are not a contraindication for re-administration of atropine.</li> <li>• Children above the age of 10 years should be treated as adults.</li> <li>• Children should always be treated on a weight-based basis. If the only atropine available is a 2 mg auto-injector, caution must be exercised to prevent overdosing. If IV access is unavailable and the child is seriously ill, a single 2mg IM dose of atropine would be acceptable (one adult auto-injector).</li> <li>• If IV access becomes possible, children less than 10 years of ages should be treated with intravenous atropine at an initial dose of 0.02 mg/kg with a minimum of 0.1mg and up to 0.5mg as the first dose.</li> <li>• Once hospitalized and when IV access has been secured, atropine should be given IV starting with standard ACLS or PALS doses, and then doubled every 2-5 minutes until –pulmonary secretions are dry. Large doses of atropine may be required over an extended period of time (hours to days).</li> </ul> <p style="text-align: center;"><b>AND</b></p> <p><b>Pralidoxime:</b></p> <ul style="list-style-type: none"> <li>• Mark I kits contain a single 600 mg dose of Pralidoxime (2PAM) .</li> <li>• Indications: <ul style="list-style-type: none"> <li>○ Any neuromuscular weakness.</li> <li>○ More than a single dose of atropine required to control symptoms.</li> </ul> </li> <li>• Administer IM every 2-5 minutes simultaneously with atropine as necessary up to 3 doses.</li> <li>• Children above age 10 can be treated as adults.</li> <li>• Smaller children should be treated intravenously if possible at a dose of 25-50 mg/kg up to 1-2 grams given as a 5% solution or less over no faster than 25-30 minutes.</li> </ul>
<b>Child (2-10 yrs)</b>	Atropine: 1 mg IM, <b>or</b> 0.02 mg/kg IV;  <b>and</b>  2-PAM Chloride: 25-50 mg/kg up to 1-2 grams IM <b>or</b> IV slowly (over 20-30 minutes) diluted to 5% concentration or less with 0.9% normal saline (e.g. 50 mg/mL)	Atropine: 2 mg IM, <b>or</b> 0.02 mg/kg IV;  <b>and</b>  2-PAM Chloride: 25-50 mg/kg up to 1-2 grams IM, <b>or</b> IV slowly (over 20-30 minutes) diluted to 5% concentration or less with 0.9% normal saline (e.g. 50 mg/mL)	
<b>Adolescent (&gt;10 yrs)</b>	Atropine: 2 mg IM, <b>or</b> 0.02 mg/kg IV;  <b>and</b>  2-PAM Chloride: 25-50 mg/kg up to 1-2 grams IM <b>or</b> IV slowly (over 20-30 minutes) in 100 mL of 0.9% normal saline	Atropine: 4 mg IM, <b>or</b> 0.02 mg/kg IV;  <b>and</b>  2-PAM Chloride: 25-50 mg/kg up to 1-2 grams IM, <b>or</b> IV slowly (over 20-30 minutes) in 100 mL of 0.9% normal saline	

1. **Mild/Moderate effects** include localized sweating, muscle fasciculations, nausea, vomiting, weakness, dyspnea.  
2. **Severe effects** include unconsciousness, convulsions, apnea, flaccid paralysis.

**TABLE 2. (continued) ANTIDOTE RECOMMENDATIONS FOLLOWING EXPOSURE TO NERVE AGENTS**

Patient Age	Antidotes		Notes and Other Treatments
	Mild/Moderate Effects <sup>1</sup>	Severe Effects <sup>2</sup>	
<b>Adult</b>	Atropine: 2 to 4 mg IM or IV;  <b>and</b>  2-PAM Chloride: 600 mg IM, or 1-2 grams IV slowly (over 20-30 minutes) in 100 mL of 0.9% normal saline	Atropine: 6 mg IM;  <b>and</b>  2-PAM Chloride: 1,800 mg IM, or 1-2 grams IV slowly (over 20-30 minutes) in 100 mL of 0.9% normal saline	<p><b>Pralidoxime (continued, for Mark I kits):</b></p> <ul style="list-style-type: none"> <li>• If intravenous access is not available, a single 600 mg dose IM would be acceptable in any child above 10 kg.</li> <li>• Even smaller children may be treated based on the urgency.</li> <li>• Once IV access has been established, <u>all patients</u> should be treated IV at a dose of 25-50 mg/kg up to 2 grams in adults and diluted to a 5% solution or less with 0.9% normal saline (e.g. 50 mg/mL), given over no faster than 20-30 minutes. Rapid infusion can cause cardiac and respiratory arrest.</li> <li>• The dose may be repeated in 1 hour if muscle weakness and/or fasciculations are not relieved.</li> <li>• Pralidoxime should be continued for at least 24 hours. Reasonable dosing is 1-2 grams every 6 hours over a 24 hour period.</li> </ul>
<b>Elderly, frail</b>	Atropine: 1 mg IM;  <b>and</b>  2-PAM Chloride: 600 mg IM, or 1-2 grams IV slowly (over 20-30 minutes) in 100 mL of 0.9% normal saline	Atropine: 2 to 4 mg IM;  <b>and</b>  2-PAM Chloride: 1800 mg IM, or 1-2 grams IV slowly (over 20-30 minutes) in 100 mL of 0.9% normal saline	<p><b>(2) IF AN IV IS ESTABLISHED:</b></p> <p><b>Atropine:</b></p> <ul style="list-style-type: none"> <li>• Atropine should be given IV starting with standard ACLS or PALS doses, and then doubled every 2-5 minutes until control is obtained.</li> <li>• It is important to remember that considerably large doses of atropine may be needed.</li> <li>• Treatment for an extended period of time (hours to days) may be necessary as well.</li> </ul> <p style="text-align: center;"><b>AND</b></p> <p><b>Pralidoxime:</b></p> <ul style="list-style-type: none"> <li>• All patients should be treated IV at a dose of 25-50 mg/kg up to 2 grams in adults, diluted in 100 mL 0.9% normal saline, given over no faster than 20-30 minutes.</li> <li>• The dose may be repeated in 1 hour if muscle weakness and/or fasciculations are not relieved.</li> <li>• Pralidoxime should be continued for at least 24 hours. Reasonable dosing is 1-2 grams every 6 hours over a 24 hour period.</li> </ul>
<p>1. <b>Mild/Moderate effects</b> include localized sweating, muscle fasciculations, nausea, vomiting, weakness, dyspnea.</p> <p>2. <b>Severe effects</b> include unconsciousness, convulsions, apnea, flaccid paralysis.</p>			

**TABLE 3. ANTIDOTE RECOMMENDATIONS FOLLOWING EXPOSURE TO CYANIDE**

Patient	Mild (conscious)	Severe (unconscious)	Other Treatment	Precautions
<b>Child</b>	If patient is conscious and has no other signs or symptoms, antidotes may not be necessary.	<p>1. 100% oxygen should always be given during treatment.</p> <p>2. Sodium bicarbonate should be infused to help maintain a near normal pH.</p> <p>3. Sodium thiosulfate:                      Infuse sodium thiosulfate intravenously. The usual pediatric dose is 1.65 mL/kg of 25% solution (0.4125 g/kg) over 10 minutes. This should be diluted 1:3 in 0.9% normal saline. The 25% solution has been shown to be irritating in young children.                      (If the child is in extremis, it may be infused more rapidly.)</p> <p>NOTE: Repeat one-half of the initial dose 30 minutes later if there is an inadequate clinical response.</p> <p style="text-align: center;"><b>and/or</b></p> <p>4. Sodium nitrite<sup>1</sup>:                      0.33 mL/kg, not to exceed 10 mL of 3% solution slow IV over no less than 5 minutes, or slower if hypotension develops</p> <p>NOTE: Once the child weighs more than 25 to 30 kg, the adult dose can be administered as described previously.</p> <p>NOTE: If nitrites are not given, many authorities recommend that thiosulfate be infused more rapidly (over 2-5 minutes)</p>	<p>For sodium nitrite-induced orthostatic hypotension, normal saline infusion and supine position are recommended.</p> <p>Sodium bicarbonate should be given for severe acidosis.</p>	<p>Victims whose clothing or skin is contaminated with hydrogen cyanide liquid or solution can secondarily contaminate response personnel by direct contact or through off-gassing vapors. Avoid dermal contact with cyanide-contaminated victims or with gastric contents of victims who may have ingested cyanide-containing materials.</p> <p>Victims exposed only to hydrogen cyanide gas do not pose contamination risks to rescuers.</p>
<b>Adult</b>	If patient is conscious and has no other signs or symptoms, antidotes may not be necessary.	<p>1. 100% oxygen should always be given during treatment.</p> <p>2. Sodium bicarbonate should be infused to help maintain a near normal pH.</p> <p>3. Sodium thiosulfate:                      Infuse sodium thiosulfate intravenously. The usual adult dose is 50 mL of 25% solution (12.5 g) infused over approximately 10 minutes. No dilution required.                      (If the patient is in extremis, it may be infused more rapidly.)</p> <p>NOTE: Repeat one-half of the initial dose 30 minutes later if there is an inadequate clinical response.</p> <p style="text-align: center;"><b>and/or</b></p> <p>4. Sodium nitrite<sup>1</sup>:                      10 mL of 3% solution slow IV over no less than 5 minutes, or slower if hypotension develops</p> <p>NOTE: If nitrites are not given, many authorities recommend that thiosulfate be infused more rapidly (over 2-5 minutes)</p>		

1. If sodium nitrite is unavailable, administer amyl nitrite by inhalation from crushable ampules.

**IN ALL CASES OF POISONING OR USE OF THESE ANTIDOTES CONTACT THE POISON CENTER AT 800.222.1222**

## **REFERENCES AND RESOURCES**

Textbook of Military Medicine – Medical Aspects of Chemical and Biological Warfare.

[http://ccc.apgea.army.mil/products/textbook/HTML\\_Restricted/index.htm](http://ccc.apgea.army.mil/products/textbook/HTML_Restricted/index.htm)

<http://chemdef.apgea.army.mil/textbook/contents.asp>

Centers for Disease Control and Prevention Public Health Emergency Preparedness and Response <http://www.bt.cdc.gov/Agent/AgentlistChem.asp>

Agency for Toxic Substances and Disease Registry (ATSDR). 2001. Managing Hazardous Materials Incidents Vol. I, II, III. Division of Toxicology, U. S. Department of Health and Human Services. Public Health Service: Atlanta, GA.

<http://www.atsdr.cdc.gov/mhmi.html>

Chemical Casualty Care Division USAMRICD. 2000. Medical Management of Chemical Casualties Handbook, Third edition. U.S. Army Medical Research Institute of Chemical Defense (USAMRICD). Aberdeen Proving Ground: Aberdeen, MD.

<http://ccc.apgea.army.mil/products/handbooks/RedHandbook/001TitlePage.htm>

U.S. Army Soldier and Biological Chemical Command (SBCCOM). 2000. Guidelines for Mass Casualty Decontamination During a Terrorist Chemical Agent Incident.

[http://hld.sbccom.army.mil/downloads/cwirp/cwirp\\_guidelines\\_mass\\_casualty\\_decon.pdf](http://hld.sbccom.army.mil/downloads/cwirp/cwirp_guidelines_mass_casualty_decon.pdf)

U.S. Army Soldier and Biological Chemical Command (SBCCOM). 2002. Guidelines for Cold Weather Mass Decontamination During a Terrorist Chemical Agent Incident.

[http://hld.sbccom.army.mil/downloads/cwirp/cwirp\\_cold\\_weather\\_mass\\_decon.pdf](http://hld.sbccom.army.mil/downloads/cwirp/cwirp_cold_weather_mass_decon.pdf)