RECOGNIZING CHEMICAL TERRORISM-RELATED ILLNESSES

Adequate planning and regular training are the key to preparedness for terrorism-related events. Healthcare providers should be alert to illness patterns and reports of chemical exposure that might signal an act of terrorism. The following clinical, epidemiological and circumstantial clues may suggest a possible chemical terrorist event:

- An unusual increase in the number of people seeking care, especially with respiratory, neurological or gastrointestinal symptoms
- Any clustering of symptoms or unusual age distribution (e.g., chemical exposure in children)
- Location of release not consistent with a chemical's use
- Simultaneous impact to human, animal and plant populations
- Any unusual clustering of patients in time or location (e.g., persons who attended the same public event)

Any unusual symptoms, illnesses or clusters of these should be reported immediately. EMS personnel should call their medical control facility and dispatching agency. The county health department and local Poison Control Center should also be notified.

PHONE NUMBERS

New York State Department of Health (NYSDOH)
Bureau of Toxic Substance Assessment
Wadsworth Center Laboratories **518-402-7800**
After hours: NYSDOH Duty Officer **518-474-7161**
After hours: SEMO State Warning Point **1-866-881-2809**
(SEMO - State Emergency Management Office) **518-457-2200**

New York City Department of Health
Poison Control Center **212-764-7667**

Your County Health Department
Consult phone book blue pages under "County Offices"

Poison Control Centers **1-800-222-1222**

MEDICAL PREPAREDNESS REFERENCES AND RESOURCES

This response card is only a summary of important information. For more detail for preparedness planning, review the following resources and those at the end of Table 2:

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

TABLE 1.
RECOGNIZING AND DIAGNOSING HEALTH EFFECTS OF CHEMICAL TERRORISM

Agent Type	Agent Names	Any Unique Characteristics	Initial Effects
Nerve	-Cyclohexyl sarin (GF) -Sarin (GB) -Soman (GD) -Tabun (GA) -VX	-Miosis (pinpoint pupils) -Copious secretions -Muscle twitching/fasciculations	-Miosis (pinpoint pupils) -Blurred/dim vision -Headache -Nausea, vomiting, diarrhea -Copious secretions/sweating -Muscle twitching/fasciculations -Breathing difficulty -Seizures
Asphyxiant/ Blood	-Arsine -Cyanogen chloride -Hydrogen cyanide	-Possible cherry red skin -Possible cyanosis -Possible frostbite*	-Confusion -Nausea -Patients may gasp for air, similar to asphyxiation but more abrupt onset -Seizures prior to death
Choking/ Pulmonary-damaging	-Chlorine -Hydrogen chloride -Nitrogen oxides -Phosgene	-Chlorine is a greenish-yellow gas with pungent odor -Phosgene gas smells like newly-mown hay or grass -Possible frostbite*	-Eye and skin irritation -Airway irritation -Dyspnea, cough -Sore throat -Chest tightness

*Frostbite may occur from skin contact with liquid arsine, cyanogen chloride or phosgene.

TABLE 1. (continued)
RECOGNIZING AND DIAGNOSING HEALTH EFFECTS OF CHEMICAL TERRORISM

Agent Type	Agent Names	Any Unique Characteristics	Initial Effects
Blistering/ Vesicant	-Mustard/Sulfur mustard (HD, H) -Mustard gas (H) -Nitrogen mustard (HN-1, HN-2, HN-3) -Lewisite (L) -Phosgene oxime (CX)	-Mustard (HD) has an odor like burning garlic or horseradish -Lewisite (L) has an odor like penetrating geranium -Phosgene oxime (CX) has a pepperish or pungent odor	-Severe irritation -Redness and blisters of the skin -Tearing, conjunctivitis, corneal damage -Mild respiratory distress to marked airway damage -May cause death
Incapacitating/ Behavior-altering	-Agent 15/BZ	-May appear as mass drug intoxication with erratic behaviors, shared realistic and distinct hallucinations, disrobing and confusion -Hyperthermia -Mydriasis (dilated pupils)	-Dry mouth and skin -Initial tachycardia -Altered consciousness, delusions, denial of illness, belligerence -Hyperthermia -Ataxia (lack of coordination) -Hallucinations -Mydriasis (dilated pupils)

TABLE 2.
DECONTAMINATION AND TREATMENT

Agent Type	Decontamination	First Aid Assess ABCs	Other Patient Considerations
Nerve	-Remove clothing immediately -Gently wash skin with soap and water -Do not abrade skin -For eyes, flush with plenty of water or normal saline	-Atropine before other measures -Pralidoxime (2-PAM) chloride	-Onset of symptoms from dermal contact with liquid forms may be delayed -Repeated antidote administration may be necessary
Asphyxiant/ Blood	-Remove clothing immediately if no frostbite* -Gently wash skin with soap and water -Do not abrade skin -For eyes, flush with plenty of water or normal saline	-Rapid treatment with oxygen -For cyanide, use antidotes (sodium nitrite and then sodium thiosulfate)	-Arsine and cyanogen chloride may cause delayed pulmonary edema
Choking/ Pulmonary-damaging	-Remove clothing immediately if no frostbite* -Gently wash skin with soap and water -Do not abrade skin -For eyes, flush with plenty of water or normal saline	-Fresh air, forced rest -Semi-upright position -If signs of respiratory distress are present, oxygen with or without positive airway pressure may be needed -Other supportive therapy, as needed	-May cause delayed pulmonary edema, even following a symptom-free period that varies in duration with the amount inhaled

*For frostbite areas, do NOT remove any adhering clothing. Wash area with plenty of warm water to release clothing.

TABLE 2. (continued)
DECONTAMINATION AND TREATMENT

Agent Type	Decontamination	First Aid Assess ABCs	Other Patient Considerations
Blistering/ Vesicant	-Immediate decontamination is essential to minimize damage -Remove clothing immediately -Gently wash skin with soap and water -Do not abrade skin -For eyes, flush with plenty of water or normal saline	-Immediately decontaminate skin -Flush eyes with water or normal saline for 10-15 minutes -If breathing difficulty, give oxygen -Supportive care	-Mustard has an asymptomatic latent period -There is no antidote or treatment for mustard -Lewisite has immediate burning pain, blisters later -Specific antidote British Anti-Lewisite (BAL) may decrease systemic effects of Lewisite -Phosgene oxime causes immediate pain -Possible pulmonary edema
Incapacitating/ Behavior-altering	-Remove clothing immediately -Gently wash skin with water or soap and water -Do not abrade skin	-Remove heavy clothing -Evaluate mental status -Use restraints as needed -Monitor core temperature carefully -Supportive care	-Hyperthermia and self-injury are largest risks -Hard to detect because it is an odorless and non-irritating substance -Possible serious arrhythmias -Specific antidote (physostigmine) may be available

References for Preparedness and Response Card:

1. 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**
2. 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**
3. U.S. Army Edgewood Research, Development and Engineering Center. 1999. Technician EMS Course. Domestic Preparedness Training Program, Version 8.0. U.S. Army SBCCOM. Aberdeen Proving Ground: Aberdeen, MD.

TABLE 3. ANTIDOTE RECOMMENDATIONS FOLLOWING EXPOSURE TO CYANIDE

Note – 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. Victims exposed only to hydrogen cyanide gas do not pose contamination risks to rescuers. **If the patient is a victim of recent smoke inhalation (may have high carboxyhemoglobin levels), administer only sodium thiosulfate.**

Patient	Mild (conscious)	Severe (unconscious)	Other Treatment
Child	If patient is conscious and has no other signs or symptoms, antidotes may not be necessary.	Sodium nitrite[1]: 0.12 - 0.33 ml/kg, not to exceed 10 ml of 3% solution[2] slow IV over no less than 5 minutes, or slower if hypotension develops **and** Sodium thiosulfate: 1.65 ml/kg of 25% solution IV over 10 - 20 minutes	For sodium nitrite-induced orthostatic hypotension, normal saline infusion and supine position are recommended. If still apneic after antidote administration, consider sodium bicarbonate for severe acidosis.
Adult	If patient is conscious and has no other signs or symptoms, antidotes may not be necessary.	Sodium nitrite[1]: 10 - 20 ml of 3% solution[2] slow IV over no less than 5 minutes, or slower if hypotension develops **and** Sodium thiosulfate: 50 ml of 25% solution IV over 10 - 20 minutes	

1. If sodium nitrite is unavailable, administer amyl nitrite by inhalation from crushable ampules.
2. Available in Pasadena Cyanide Antidote Kit, formerly Lilly Cyanide Kit.

TABLE 4. ANTIDOTE RECOMMENDATIONS FOLLOWING EXPOSURE TO NERVE AGENTS

Patient Age	Antidotes: Mild/Moderate Effects[1]	Antidotes: Severe Effects[2]	Other Treatment
Infants (0-2 yrs)	Atropine: 0.05 mg/kg IM, **or** 0.02 mg/kg IV; **and** 2-PAM Chloride: 15 mg/kg IM **or** IV slowly	Atropine: 0.1 mg/kg IM, **or** 0.02 mg/kg IV; **and** 2-PAM Chloride: 25 mg/kg IM, **or** 15 mg/kg IV slowly	Assisted ventilation after antidotes for severe exposure. **Repeat atropine (2 mg IM, or 1 mg IM for infants)** at 5 - 10 minute intervals until secretions have diminished and breathing is comfortable or airway resistance has returned to near normal. **Phentolamine** for 2-PAM-induced hypertension: (5 mg IV for adults; 1 mg IV for children). **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).
Child (2-10 yrs)	Atropine: 1 mg IM, **or** 0.02 mg/kg IV; **and** 2-PAM Chloride[3]: 15 mg/kg IM **or** IV slowly	Atropine: 2 mg IM, **or** 0.02 mg/kg IV; **and** 2-PAM Chloride[3]: 25 mg/kg IM, **or** 15 mg/kg IV slowly	
Adolescent (>10 yrs)	Atropine: 2 mg IM, **or** 0.02 mg/kg IV; **and** 2-PAM Chloride[3]: 15 mg/kg IM **or** IV slowly	Atropine: 4 mg IM, **or** 0.02 mg/kg IV; **and** 2-PAM Chloride[3]: 25 mg/kg IM, **or** 15 mg/kg IV slowly	
Adult	Atropine: 2 to 4 mg IM **or** IV; **and** 2-PAM Chloride: 600 mg IM, **or** 15 mg/kg IV slowly	Atropine: 6 mg IM; **and** 2-PAM Chloride: 1,800 mg IM, **or** 15 mg/kg IV slowly	
Elderly, frail	Atropine: 1 mg IM; **and** 2-PAM Chloride: 10 mg/kg IM, **or** 5 to 10 mg/kg IV slowly	Atropine: 2 to 4 mg IM; **and** 2-PAM Chloride: 25 mg/kg IM, **or** 5 to 10 mg/kg IV slowly	

1. **Mild/Moderate effects** include localized sweating, muscle fasciculations, nausea, vomiting, weakness, dyspnea.
2. **Severe effects** include unconsciousness, convulsions, apnea, flaccid paralysis.
3. If calculated dose exceeds the adult IM dose, adjust accordingly.

NOTE: 2-PAM Chloride is Pralidoxime Chloride or Protopam Chloride.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

DO NOT BECOME A CASUALTY!

First responders face the greatest exposure potential, often to unidentified agents. To protect yourself:

- Be alert
- Keep an appropriate distance
- Stay upwind
- Wait for assessment by a HAZMAT team before entering

Ideally, responders in an unknown situation should wear Level A PPE. Exposure can occur from inhalation of vapors, dermal contact or eye contact. The following is a general discussion to help responders/healthcare providers determine appropriate PPE.

PPE to Prevent Inhalation Exposure:

Protection from both vapors and particulates may be required when the 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.

PPE to Prevent Dermal Exposure:

Latex examination gloves provide very little protection from most chemical agents and can cause allergies. Gloves made of Viton, nitrile, butyl or neoprene provide more protection and, in some styles, allow adequate dexterity. However, the resistance of these materials to different chemicals varies and 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:

Full-face respirators, PAPR and SCBA will provide protection from both splashes and vapors. Protective eyewear, such as goggles or a face shield, will not provide protection from chemical vapors. Protective eyewear is required during decontamination to prevent splashing into eyes.

DECONTAMINATION GUIDELINES

Proper decontamination is often 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. Removed clothing should be bagged, sealed and retained as possible evidence.

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 soap and water followed by a thorough water rinse. For eyes, flush with plenty of water. Decontamination water may need to be contained.

Bleach solutions, concentrated or dilute, should not be used on people. Diluted bleach (1 part household bleach to 9 parts water) can be used on 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 which 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.

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.

DISCLAIMER

The information on this card is meant to be a quick guide and is not intended to be comprehensive. This information or the web sites and references listed in this card are not a substitute for professional medical advice, diagnosis, or treatment of the individual. Please consult other references, Poison Control Center, and check antidote dosages, particularly for children and pregnant women.

CHEMICAL TERRORISM

Preparedness and Response Card

State of New York • George E. Pataki, Governor
Department of Health • Antonia C. Novello, M.D., M.P.H., Dr. P.H., Commissioner
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