

Cyanide Antidote Kits

Supersedes:

Effective: 11-24-03

As a result of funding from The U.S. Department Homeland Defense, BEMS is increasing its level of supplies, antidotes and antibiotics to respond to a variety of CBRNE threats. One goal was to increase our supply of cyanide antidote kits. Effective immediately two kits will be issued to every ALS unit. In addition two kits will be issued to the Shift Commander. A much larger cache of antidote will be staged and available for rapid deployment. The use of these kits is a medical control option. Please take the time to review this document and inspect the antidote kits in your ambulances.

Cyanide is available in several forms. It can exist as a salt, such as sodium or potassium cyanide. Or as a liquid that can form a gas, as is found with cyanogens chloride, which can have an irritating, pungent odor and is also less volatile. Hydrogen cyanide can also exist as a liquid, but is easy to volatilize and poses a significant inhalation risk. It can be a hazard for many routes of entry: dermal, ingestion and most importantly inhalation route of exposure. Many people cannot smell the characteristics "bitter almond" odor of hydrogen cyanide, so this should not be used as an absolute criteria for considering cyanide exposure. Most cyanide forms cause rapid symptoms, effects of the poisoning can be seen within several minutes of exposure.

The various forms of cyanide are used for industrial purposes: electroplating, photo processing, metal recovery and fumigation. Cyanides can also be found in laboratories. Protective equipment should be donned whenever approaching a patient that could be contaminated with one of the cyanide forms. Personnel approaching a suspected or confirmed cyanide incident should not enter the warm or hot zone.

Scott AV 2000 and MPC plus canister will provide approximately 30 minutes of protection under escape and evasion/relocation circumstances. Scott air-pack (supplied air respirator) will provide more protection. Open spaces will decrease the risk and level of potential exposure to a cyanide contamination.

Patients with liquid, solid (sodium or potassium cyanide) or gas exposure should be decontaminated prior to contact with BEMS personnel. Patients that have been determined to be **fully decontaminated** can be approached using department issued protective turn out gear and are safe to receive medical attention without respiratory protection. If there is any doubt as to a patient's decontamination status the crew should immediately don their Scott AV 2000 with MPC plus canister while relocating to a safe area, uphill and upwind.

Treatment of the patient with known or suspected dermal contamination should only be undertaken by personnel who have been trained to the 40-hour hazardous materials response level. Personnel will don respiratory and dermal protection (level b chemical protective suit) to respond to direct patient care issues, this will be undertaken when issued and authorized by the incident commander.

SIGNS AND SYMPTOMS OF CYANIDE EXPOSURE

Cyanogen Chloride: Be aware that initial and low dose exposure might be those of irritation after exposure to cyanogens chloride, similar to other irritant gasses such as pepper spray. However, typical irritant gasses will not be associated with more serious symptoms of seizures, respiratory or cardiovascular collapse.

- In low doses
 - Bronchorrhea
 - Lacrimation
 - Rhinorrhea
- In moderate doses
 - Transient hyperpnea
 - Feelings of anxiety or apprehension
 - Vertigo
 - Nausea and/or vomiting
 - Prolonged prodrome prior to loss of consciousness
 - Seizures
 - Bradypnea followed by apnea
 - Cardiac arrest
- In high doses
 - Transient hyperpnea
 - Seizures 15-30 seconds later
 - Apnea 2-3 minutes later
 - Cardiac arrest 6-8 minutes post exposure
 - Onset possibly takes several minutes, except for immediate irritant effects

Hydrogen Cyanide:

- Symptoms after exposure to lower vapor concentrations or after ingestion and/or liquid exposure
 - May be several minutes before onset
 - Transient hyperpnea
 - Feelings of apprehension or anxiety
 - Vertigo
 - Feeling of weakness
 - Nausea with or without vomiting
 - Muscular trembling
 - Progression of symptoms to unconsciousness
 - Bradypnea followed by apnea
 - Convulsions
 - Cardiac dysrhythmias followed by cardiac arrest
- Symptoms after high vapor exposure
 - Transient hyperpnea and hypertension 15 seconds after inhalation
 - Convulsions 15-30 seconds later
 - Respiratory arrest 2-3 minutes later
 - Bradycardia, hypotension, and cardiac arrest within 6-8 minutes of exposure

Antidote/Treatment of Patients suffering from cyanide poisoning

- Pre-oxygenation using BVM or Non-rebreather facemask, patients with low dose exposures might only require oxygen therapy, antidotal therapy best saved for those with moderated to severe exposure
- Amyl nitrite ampoules are to be used if intravenous access is not yet available
- Cyanide antidote kit is a medical control option

Part I of Cyanide Antidote Kit

Amyl nitrite (Isoamyl Nitrate) -- Ampoules can be crushed into gauze and inhaled or broken into an Ambu bag and ventilated into the patient; only a temporary measure until IV access is obtained.	
Adult Dose	1 amp (0.2 mL) for 30-60 sec along with 100% oxygen until IV access is obtained
Pediatric Dose	Not Established
Contraindications	Documented hypersensitivity; severe anemia; closed-angle glaucoma; head trauma; postural hypertension and hypotension; cerebral hemorrhage
Interactions	Co-administration with alcohol may cause severe hypotension and cardiovascular collapse; with calcium channel blockers, may produce symptomatic orthostatic hypotension; aspirin may increase nitrate serum concentrations
Pregnancy	C- Safety for use during pregnancy has not been established
Precautions	Can cause severe methemoglobinemia in overdose or in those with G-6-PD deficiency; in rare instances has caused hemolytic anemia

Part II of Cyanide Antidote Kit

Sodium nitrite -- DOC if IV access is available. Creates methemoglobinemia more effectively than amyl nitrite. This dose assumes hemoglobin level of 12 mg/dL; dosage adjustment necessary in patients with anemia. Half original dose may be repeated in 1 h if patient continues to exhibit signs of cyanide toxicity.	
--	--

Adult Dose	300 mg (10 mL 3% sol) IV over 5-20 min; slow infusion if patient develops hypotension
Pediatric Dose	0.33 mL/kg of 10% solution IV over 5-20 min, not to exceed 300 mg
Contraindications	Documented hypersensitivity; severe carbon monoxide poisoning
Interactions	May potentiate hypotensive effects of other medications
Pregnancy	C - Safety for use during pregnancy has not been established
Precautions	Can cause severe methemoglobinemia in overdose or in those with G-6-PD deficiency; in rare instances has caused hemolytic anemia

Part III of Cyanide Antidote Kit

Sodium thiosulfate (Tinver) -- Acts as donor of sulfane sulfur, which is used as a substrate by rhodanese and other sulfurtransferases for conversion of cyanide to thiocyanate. DOC for treating cyanide toxicity with concomitant carbon monoxide poisoning.	
Adult Dose	12.5 g (50 mL) IV delivered over 10 min; repeat at half initial dose in 1 h if symptoms persist
Pediatric Dose	1.65 mL/kg of 25% solution over 10 min, not to exceed 12.5 g; repeat in 1 h at half initial dose if symptoms persist
Contraindications	Documented hypersensitivity
Interactions	None reported
Pregnancy	C - Safety for use during pregnancy has not been established.
Precautions	Rapid IV infusion may cause transient hypotension and ECG changes

Source: emedicine