

Sarasota County Fire Department



HAZARDOUS MATERIALS MEDICAL TREATMENT PROTOCOLS

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SYSTEM DESCRIPTION

PURPOSE

It is the intent of these Hazardous Materials Medical Care Protocols to facilitate rapid medical identification and possible intervention of a victim or victims of a chemical exposure within the response community, at a medical event and/or at the scene of a Hazardous Materials Incident, or Weapons of Mass Destruction event. It is a layered response approach dependent on the human and physical resources a department/agency may have available.

TYPES OF RESPONDERS

It is the responsibility of all individuals involved in this type of response to take precautions to reduce secondary exposure while at the same time rendering appropriate medical care. All persons called upon to respond to a Hazardous Materials Emergency shall be trained to the Operations Level of response as defined by OSHA 29 CFR 1910.120 and the most current edition NFPA 472. Then, depending upon their expected role as defined by their employer's emergency response plan, additional training shall be provided to meet their expected mission. It is the responsibility of those responders designated as:

EMS Core Responder – is defined as a BLS qualified responder that has successfully completed an Operational Core curriculum competencies as identified in NFPA 472 2008 ed. Their role at a Hazmat/WMD incident is limited to support functions. This definition would be best applied to inter-facility transport personnel that would not be performing functions in the hot or warm zone of operations. Nor would they be caring for the hazardous materials patient.

HazMat/WMD Rescuer is defined as either a BLS or ALS responder that has successfully completed an Operational Core competencies and mission specific competencies for victim rescue, personal protective equipment, technical and mass decontamination as defined NFPA 472 and BLS HazMat skills as defined by NFPA 473 at the BLS Level.. Their role at a Hazmat/WMD incident would be to perform life saving rescue within the limits of the personal protective equipment provided to them by their employer, to perform or assist with mass and/or technical decontamination and to provide patient care in accordance with their approved medical protocols.

Toxmedic – is defined as an ALS responder (State of Florida Certified Paramedic) and has successfully completed and demonstrated Operational Core and mission specific competencies for victim rescue, personal protective equipment, technical and mass decontamination as defined NFPA 472 2008 ed. In addition, the Toxmedic shall meet and demonstrate competency in NFPA 473 ALS 2008 ed. as well as treatment

modalities for any additional toxic syndromes addressed in this protocol.

HazMat Medic – is defined as an ALS responder (State of Florida Certified Paramedic) and has successfully completed and demonstrated competency as a Hazardous Materials Technician in accordance with NFPA 472 2008 ed. In addition, the HazMat Medic shall meet and demonstrate competency in NFPA 473 ALS 2008 ed. as well as treatment modalities for any additional toxic syndromes addressed in this document.

Training Matrix

	Mission Specific Competencies												
	NFPA 472 Ops Core	PPE Mission	Mass Decon	Technical Decon	Evidence & Sampling	Product Control	Air Monit. & Sampling	Victim Rescue	Illicit Labs	NFPA 473 BLS EMS	NFPA 473 ALS EMS	Toxic Syndromes	NFPA 472 Technician
EMS Hazmat/WMD Core	X												
EMS HazMat/WMD Rescuer	X	X	X	X	X			X		X or	X		
"Toxmedic"	X	X	X		X			X			X	X	
"HazMat Medic"	X	X ¹	X ¹	X ¹	X ¹	X ¹	X ¹	X ¹	X ¹		X	X	X

Notes: ¹ The HazMat Medic completes mission specific competencies by virtue of completion of NFPA 472 Technician Level training competencies.

POLICY

In addition to our general medical care protocols, SCFD is implementing these Hazardous Materials Medical Care Protocols for the emergency treatment and handling for chemical specific and non-specific exposure.

The possibility of secondary contamination shall be recognized and measures taken to reduce the chance of such contamination. Appropriate protective gear shall be worn at all applicable times during treatment procedures. When feasible contamination shall be left at the scene of the emergency with appropriate precautions for the definitive care facility.

If there will be extended operations with the possibility of exposure, or victims

transported for definitive medical care from a medical call involving Hazardous Materials/WMD, EMS personnel should notify the closest appropriate medical facility, advising the emergency department of the nature, possible number of victims, and extent of operations from the scene. This advance notification will alert the hospital of the need to set up decontamination and / or isolation areas for treatment of exposed individuals. The report should include if possible specific names of chemicals involved, specific amounts, and the type of exposure expected, i.e. inhalation, skin absorption, ingestion, or injection.

PROCEDURE

Site and personal safety is of paramount concern for the responder. Site Safety “standard practices” shall include barring entry into the Hot Zone without proper precautions, proper protective clothing based on the risk, and knowledge and permission of the Incident Commander. Treatment can begin when it is safe to do so this would include but not limited to Basic Life Support procedures. Patients should be evaluated for contamination and decontaminated accordingly. The following Hazardous Materials medical care guidelines are designed and applied based on the level of training the responder possess and maintains along with the equipment levels at the responders disposal. These are classified within three levels of HazMat medical response. At each level the prerequisite procedures apply.

1 – EMS Core

- Secure airway
- Avoid all body fluids and protect against secondary contamination
- With history of ingestion protect against secondary contamination due to burping and/or emesis
- Supplemental Oxygen as indicated; record and monitor vitals
- Obtain a history
 - Method of exposure (Inhalation, topical, ingestion)
 - Specific agent involved
 - Exact time of exposure
 - Duration of exposure
 - Quantity and concentration of substance involved in the exposure
 - Specific symptoms and duration of symptoms since exposure
 - Identifying positive symptom consistent with chemical exposure
 - Identifying negative symptoms that are not consistent with exposure
 - Past medical history, medications, allergies, and/or exposures

- Transport in vehicle that is properly prepared and with properly operating ventilation.
- Contact local Emergency Department
- Contact the Regional Poison Control Center (1-800-222-1222) for additional guidance.
- If from a facility any documents such as MSDS brought to the ED
- Victim, partner and self administration of auto injectors shall be authorized if the responder has been qualified by the medical director. These auto-injectors may include: “Doudote”, “Atropine”, 2-Pam Chloride & “Diazepam” as called for by these protocols.

2 – HazMat/WMD Rescuer

In addition to the actions identified for the EMS Core Responder, the Hazmat/WMD Rescuer shall:

- Conduct life saving rescuer within the limits of the PPE available.
- Perform or assist with mass or technical decontamination
- Provide medical care in accordance with established protocols

3 – Toxmedic

The Tox-medic shall perform all of the EMS Operations functions along with ALS General Medical and ALS Specific HazMat/WMD Medical Guidelines. Assistance from the HazMat Medic or HazMat Technician is recommended based upon the hazards and risks associated with the incident in order to ensure safety, procedures, and considerations from the hazardous materials aspect are addressed.

4 – HazMat Medic

The HazMat Medic shall perform the functions of the EMS Operations, ALS treatment modalities, evaluation for toxidromes (toxic syndromes) and have communication with the Regional Poison Control for the development of a medical plan.

The HazMat Medic has additional skill level which allows him/her to operate as a HazMat Technician, utilizing his/her analyzing ability to characterize the chemical into a chemical family, hazard class, or potential analog, by using air monitoring techniques, and/or chemical observations.

TRAINING OF PERSONNEL

Sarasota County Fire Department shall utilize a tiered system of ALS Hazardous Materials treatment response: "Paramedic Level" and "Toxmedic/HazMat Medic Level".

All line medical personnel shall be responsible for understanding the basic concepts of each protocol and the treatment procedures that are required at their level.

"HazMat Medics" and "Toxmedics" will be trained to provide the full medical treatment as defined by these protocols. In addition, during multi-casualty events or other situations requiring the assistance of other paramedics, the HazMat Medics or Toxmedics may provide direction to other Paramedics in the delivery of care in accordance with these protocols.

In order to support this system, three levels of training are identified:

1) "HazMat/ToxMedic Instructor"

The HazMat Medic Instructor is capable of training line paramedics to serve as a HazMat Medic. In order to be a HazMat Medic Instructor, the individual must meet the following requirements.

- a) Paramedic assigned to Special Operations
- b) Successfully completed the National Fire Academy's Advanced Life Support Response to Hazardous Materials
- c) Is an instructor approved by the Training Division of Sarasota County Fire Department or the Sarasota County Technical Institute in that they have:
 - Completed a class in educational methodology.
 - Have at least 5 years experience in their field of expertise (Hazardous materials).
- d) Meets the training requirements as a Hazardous Materials Technician as defined by Sarasota County Fire Department.
- e) Has attended a train-the-trainer class as defined by the department and has been positively evaluated by a qualified instructor.

2) "Paramedic Level"

All Paramedic Level personnel will be responsible to understand the basic concepts of each protocol and how to deliver the medical care called for by these protocols at their level. These personnel must attend a training program of not less than 4 hours duration covering the following topics:

- a) Medical Response to Hazardous Materials (Policy and

- Procedures review).
- b) Review of multi-casualty incident management procedures and START Triage.
 - c) Personnel protective equipment requirements for medical care during hazardous materials emergencies.
 - d) The basic psychological effects addressed by each of these protocols.
 - e) The treatment protocol to the level that they will be expected to provide.

3) “HazMat Medic or Toxmedic”

HazMat Medics are capable of providing all care defined within these protocols without direct medical control unless otherwise noted in these protocols. A HazMat Medic must meet the following requirements:

- a) Be a licensed Paramedic for the Sarasota County Fire Department.
- b) Attend a class of instruction of not less than 24 hours covering the topics of Hazardous Materials EMS Response Systems, the physiological effects of hazardous materials and their treatment.

TOXIC SYNDROMES (TOXIDROMES)

Toxic syndromes (toxidromes) are clinical syndromes that the patient presents with. These patterns of signs and symptoms are essential for the successful recognition of chemical exposure. The toxidromes identified in this protocol are chemical exposure based while others such as the opioids are found within general medical protocol. These chemical toxidromes are identified clinically into five syndromes:

- Irritant Gas Toxidrome
- Asphyxiant Toxidrome
- Corrosive Toxidrome
- Hydrocarbon and Halogenated Hydrocarbons Toxidrome
- Cholinergic Toxidrome

Each can present as a clinical manifestation of the chemical/poisoning involved with some cross-over between toxidromes. This list combines the toxic syndromes found within NFPA 473 A.5.4.1(2) and traditional syndromes.

General Symptomology Correlation to Toxidrome

Toxidrome	General Symptomology	General Examples	Protocol
Irritant Gas Syndrome (see Corrosive syndrome)	Irritation to mucus membranes Bronchospasm Non-cardigenic PE	Ammonia Formaldehyde Chlorine Phosgene	H2
Asphyxiant Syndrome	Hypoxemia CNS & CVS effects	Carbon Monoxide Methemoglobin forming Cyanides Sulfides Azides	H3 H5 H7 H6
Corrosive Syndrome	Chemical burns Coagulative necrosis Liquefactive necrosis	Acids Acetic Acid Nitric Acid Hydrochloric Acid Bases Potassium hydroxide Sodium hydroxide	H1 H2
Hydrocarbon & Halogenated HC	Hypoxemia CNS & CVS effects	Methane Butane Hexane Turpentine Toluene	H1
Cholinergic Syndrome	Muscarinic Effects DUMBELS Nicotinic Effects Tachycardia, Weakness, Hypertension, Fasciulations	Malathion Parathion Chlorpyrifos Aldicarb Proprur	H4

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General Hazardous Materials Treatment	
Protocol Title	Color Code
<input type="checkbox"/> General protocol for all hazardous materials exposures	H-1
Covered Materials	Protocol No.

THIS PROTOCOL IS APPLICABLE TO ALL SARASOTA COUNTY EMS PROVIDERS

Responder self-protection is a paramount of importance when dealing with hazardous materials. The hazards of the material(s) involved need to be identified and a well developed risk assessment must be made by qualified hazardous materials technicians.

During the initial stages of the event and prior to the arrival of HazMat Technicians, the EMS responder needs to review and heed the recommendations of the North American Emergency Response Guide Book (NAERG). If the material involved cannot be readily identified, then follow the recommendations of the first guidepage in the NAERG, guide page # 111, until more definitive information can be found.

Any attempts to rescue a victim from a hazardous environment needs to be based upon a well thought risk/benefit analysis. The size-up of the scene, likelihood of victim survival, likelihood of success and the protective abilities the responder's personal protective equipment (PPE) all must be assessed prior to implementing any such rescue attempts. The NAERG provides good guidance with regarding PPE capabilities and limitations during "quick in and out" life saving rescues and should be consulted.

Responders need to value the difference between "exposure" and "contamination". Not all exposures result in a contaminate patient. Physical state of the product, location of the patient with regards to the release and direct contact with the product all play in determining possibly of contamination.

In addition to the patient care discussed below, protection of downstream medical facilities from contamination must be considered. Early notification of receiving facilities and field decontamination are essential.

- Request Hazardous Material Team and HazMat Medic assistance early.**

- **Self-protection of personnel.** Follow PPE recommendations of the NAERG until further hazard/risk assessment can be performed by qualified technicians.
- **MCI incidents follow S.T.A.R.T. Traige**
- **Prevent further exposure of the patient.** Rapidly remove viable victims from hazardous environment.
- **Provide supportive (BLS) care only once safe to do so.**
 - Maintain Airway and provide supplemental oxygen PRN
- **Decontaminate as deemed necessary**
 - Remove contaminated clothing
 - Victims exposed only to gases and vapors present little risk of secondary contamination/exposure once clothing is removed.
 - If exposed to corrosive gases and vapors (Chlorine, ammonia, HCL, ect.) then flush with water.
 - Flush with water for contamination by liquids and solids.
 - Stable, non-life threatening patients who are contaminated by liquids and solids that are not readily water soluble should be provided secondary decontamination in the field.
- **Provide Supportive ALS Care (all paramedics)**
 - Provide supplemental oxygen by appropriate means and rate (supplemental oxygen contraindicated in diprydil poisoning such as paraquat and diquat) seek guidance of supervising physician or poison control center
 - Establish vascular access IV/IO when appropriate
 - Initiate cardiac monitoring, treat dysrhythmias PRN in accordance Section 2 “Cardiac arrest” and Section 3 “Cardiopulmonary Emergencies” protocols
 - Monitor oxygen saturation and if available carboxyhemoglobin and methemoglobin levels
 - Proceed to “Acid, Alkali and Respiratory Irritant Protocol” H-2 (Yellow) as appropriate
 - Proceed to “Cholinesterase Crisis Protocol” H-5 (Green) for suspected nerve agent, organophosphate or carbamate pesticide poisoning (Mark I autoinjectors are authorized for suspected nerve agent exposure in accordance with the technical protocol for Mark I Autoinjectors)
 - If patient is seizing, administer **midazolam (versed)** 0.05 mg/kg slow IV/IO/IN bolus maximum dose 5 mg) titrated to cessation of seizure activity. Repeat once prn. (Refer to Seizure-Adult Protocol 5.7).
 - **10 mg/IM Valium autoinjectors** are authorized for the mass casualty incidents involving 5 or more patients with seizures

- Treat hypotension by appropriate means
- **Consider contacting Poison Information Center at 1 – 800 – 222 – 1222 for further information and guidance.**
- **Provide ALS Material Specific Care (HazMat Medic or Toxmedic)**
 - If applicable, follow protocol at the HazMat Medic Level based upon the material involved

Acids, Alkalis & Respiratory Irritants	Yellow
Protocol Title	Color Code
<input type="checkbox"/> Acids and acid mists <input type="checkbox"/> Alkaline compounds <input type="checkbox"/> Ammonia (liquids and gases) <input type="checkbox"/> Chlorine Gas and Phosgene <input type="checkbox"/> Isocyanate and diisocyanate compounds (Methylene biphenyl isocyanate, ethyl isocyanate, methylene diisocyanate, toluene isocyanate, TDI, MDI) <input type="checkbox"/> Blister agents - sulfur mustard (HS), nitrogen mustard (HD) and lewisite (L) <input type="checkbox"/> Respiratory irritants	H-2
Covered Materials	Protocol No.

THIS PROTOCOL IS APPLICABLE TO ALL SARASOTA COUNTY EMS PROVIDERS

SIGNS AND SYMPTOMS

Low concentrations of airborne acids and alkalis can produce rapid onset of eye, nose and throat irritation. Higher concentrations (low concentrations of ammonia) can produce cough, stridor, wheezing and non-cardiogenic pulmonary edema. Ingestion of acids and alkalis can result in severe injury to the upper airway, esophagus and stomach. In addition; there may be circulatory collapse as well as partial or full thickness burns.

A key consideration concerning the effects of respiratory irritants is water solubility. Water soluble materials tend to irritate upper airway passages resulting in cough reflex, wheezing and bronchospasm. Unless the patient has a pre-existing pulmonary condition (asthma, COPD) symptoms from mild to moderate exposures tend to improve with fresh air and good ventilation. Whereas with non-water soluble respiratory irritants or, in cases of severe exposure to water soluble irritants, non-cardiogenic pulmonary edema can develop which can have delayed onset of 6 – 10 hrs. Any significant exposure to a respiratory irritant needs to be evaluated at a medical facility.

End-stage symptoms or respiratory irritation may resemble organophosphate poisoning do to profound fluid involmnet. However; patients will have NORMAL OR DILATED PUPILS (patient will not have pinpoint pupils). These patients should not be given Atropine or 2-PAM.

SUPPORTIVE CARE

Follow general hazardous materials Treatment Protocol H-1

Follow Technical Protocol for Morgan Lenses and Eye Irrigation as appropriate

If patient has external burns, refer to Burns Protocol 4.4

Consider contacting Poison Information Center (1-800-222-1222).

If patient has non-cardiogenic pulmonary edema, maintain adequate ventilation and oxygenation, providing pulmonary suctioning and treat with CPAP in accordance with Airway Management Protocol 7.1(6). **NTG and Morphine sulfate are contraindicated in chemically induced non-cardiogenic pulmonary edema.**

If patient has bronchospasm, administer **albuterol** (2.5 mg/3 ml) mixed with **ipratropium** (0.5 mg/ 2.5 ml) by nebulizer. Repeat **albuterol** twice without **ipratropium**. In accordance with obstructive airway disease protocol 3.7.

If patient has inhaled chlorine or hydrochloric acid (HCl) and has significant respiratory distress, administer **sodium bicarbonate** via nebulizer (8.4% 3ml mixed with **normal saline** 3ml or 4.2% 6ml).

Carbon Monoxide, Aromatic and Chlorinated Hydrocarbons	BLUE
Protocol Title	Color Code
<input type="checkbox"/> Aromatic Hydrocarbons (Benzene, Toluene and Xylene) <input type="checkbox"/> Arsenic compounds and other heavy metals <input type="checkbox"/> Chlorinated hydrocarbons (Methylene chloride, tetrachloroethylene, dry cleaning compounds) <input type="checkbox"/> Ketones (methyl ethyl ketone, acetone)	H-3
Covered Materials	Protocol No.

THIS PROTOCOL IS APPLICABLE TO ALL SARASOTA COUNTY EMS PROVIDERS

MILD EXPOSURE SIGNS AND SYMPTOMS

Include cough, hoarseness, headache, poor concentration, irritability, agitation, anxiety, drowsiness, dizziness, weakness, tremors, transient euphoria, vision and hearing disturbances, nausea/vomiting, salivation, diarrhea, stomach pain and chemical burns with chlorinated hydrocarbons (**for arsenic signs and symptoms see below**).

MODERATE TO SEVERE EXPOSURE SIGNS AND SYMPTOMS

Include cardiovascular collapse, tachy-dysrhythmias (especially ventricular fibrillation), chest pain, pulmonary edema, dyspnea, tachypnea, respiratory failure, paralysis, altered mental status, seizures, excessive salivation, pale skin, cyanosis, rarely cherry red skin with carbon monoxide and delayed carcinogenic effects (**for arsenic signs and symptoms see below**).

ARSENIC EXPOSURE SIGNS AND SYMPTOMS

Include severe gastrointestinal fluid loss, burning abdominal pain, watery or bloody diarrhea, muscle spasm, seizures, cardiovascular collapse, tachycardia, hypotension, ventricular dysrhythmias, shock and coma. There may be respiratory or cardiac arrest and acute renal failure may occur with bronze urine within a few minutes.

End-stage symptoms may resemble organophosphate poisoning. However; patients will have NORMAL OR DILATED PUPILS (patient will not have pinpoint pupils). These patients should not be given Atropine or 2-PAM. Products may be FLAMMABLE.

SUPPORTIVE CARE

Follow general hazardous materials Treatment Protocol H-1

For Carbon Monoxide exposure provide 100% oxygen by any appropriate means. If available monitor and document carboxyhemoglobin levels

If patient has external burns, refer to Burns Protocol 4.4

Consider contacting Poison Information Center (1-800-222-1222) or seek assistance of HazMat Medic.

If patient has dysrhythmias, treat PRN (refer to Protocol Sections 2 & 3) (c).

If patient is seizing, administer **midazolam (versed)** 0.05 mg/kg slow IV/IO/IN bolus maximum dose 5 mg) titrated to cessation of seizure activity. Repeat once prn. (Refer to Seizure-Adult Protocol 5.7).

Special Notes: Chlorinated and aromatic hydrocarbons decrease the fibrillation threshold of cardiac tissue. Administration of **epinephrine** to patients in a non-code status may not be desirable for this group of patients. Seek guidance of Poison Information Center concerning use of **epinephrine** in these cases.

Methemoglobinemia	GRAY
Protocol Title	Color Code
<input type="checkbox"/> Dinitrobenzene <input type="checkbox"/> Nitrogen base products <input type="checkbox"/> Oxides of nitrogen <input type="checkbox"/> Fire gases from structural fires and fires involving nitrogen based compounds	H-4
Covered Materials	Protocol No.

SIGNS AND SYMPTOMS

Methemoglobin formers convert iron in the hemoglobin from Fe^{+2} (Ferrous) state to Fe^{+3} (Ferric) state. When in the Ferric state, hemoglobin is unable to transport oxygen. The result is a naturally irreversible state that presents very similarly to carboxyhemoglobin found in CO poisoning.

Methemoglobinemia in concentrations of 15% and greater are characterized by signs of hypoxia, chocolate-brown-colored blood, CNS depression, headache, dizziness, vertigo, tinnitus, dyspnea, tachypnea, hypotension, heart blocks, ventricular dysrhythmias, seizures (rare), pallor, cyanosis and cardiovascular collapse and other symptoms of hypoxia. Hypoxia, refractory to good oxygenation in the hazardous material setting, assess closely for methemoglobinemia.

SUPPORTIVE CARE

Follow general hazardous materials Treatment Protocol H-1

Follow Technical Protocol for Morgan Lenses and Eye Irrigation as appropriate

If patient has external burns, refer to Burns Protocol 4.4

Consider contacting Poison Information Center (1-800-222-1222).

If patient has non-cardiogenic pulmonary edema, maintain adequate ventilation and oxygenation, providing pulmonary suctioning and treat with CPAP in accordance with Airway Management Protocol 7.1(6). **NTG and Morphine sulfate are contraindicated in chemically induced non-cardiogenic pulmonary edema.**

Consider contacting Poison Information Center (1-800-222-1222) or seek assistance of HazMat Medic.

HAZMAT or TOXMEDIC

If Nitrogen product ingestion, administer Activated Charcoal 50 gm PO if available.

If available, monitor MetHB levels by non-invasive means.

If MetHB levels are greater than 15% or, if the patient is dyspneic, cyanotic, normal SpO2 or SpO2 trending towards 85% and has chocolate-brown-colored blood, administer **methylene blue** (1%) 1-2 mg/kg slow IV over 5 minutes, followed by a NS 30 ml flush to decrease pain at site.

If cyanosis or MetHB levels persists, administer **methylene blue** (1%) 1-2 mg/kg slow IV over 5 minutes, followed by a NS 30 ml flush to decrease pain at site.

Organophosphate, Carbamate	GREEN
Protocol Title	Color Code
<input type="checkbox"/> Organophosphate insecticides <input type="checkbox"/> Carbamate insecticides <input type="checkbox"/> Nerve Agents (GA, GB, GD, GF, VX) Sarin, Soman, Tabum	H-5
Covered Materials	Protocol No.

SIGNS AND SYMPTOMS

These products ultimately result in the overstimulation of the parasympathetic nervous systems by allowing and over accumulation of acetylcholine within the synapse.

The muscarinic effects are described as the classic **SLUDGEM** syndrome (excessive **S**alivation, **L**acrimation, **U**rination, **D**iarrhea, **G**astrointestinal distress, and **E**mesis and **M**iosis (pinpoint pupils).

Additional muscarinic effects include: bronchorrhea, bronchospasm and bradycardia. The patient will have **constricted pupils** (miosis, which may last up to two months – despite appropriate treatment) and visual disturbances (darkened, out of focus vision) with inhalation or skin exposure. Ingestion may or may not cause miosis.

However; stimulation of nicotinic receptors will produce tachycardia, muscle paralysis (apnea), muscle twitching/fasciculations and seizures.

Ultimate cause of death for these patients is hypoxia/anoxia by pulmonary edema secondary to profound bronchial secretions.

SUPPORTIVE CARE

Follow general hazardous materials Treatment Protocol H-1

If patient has non-cardiogenic pulmonary edema, maintain adequate ventilation and oxygenation, providing pulmonary suctioning and treat with CPAP in accordance with Airway Management Protocol 7.1(6). **NTG and Morphine sulfate are contraindicated in chemically induced non-cardiogenic pulmonary edema.**

Avoid exposure to patient's sweat, vomit, stool and vapor emitting from soaked clothes.

If patient was exposed externally, remove clothing and decontaminate as appropriate (place clothes in sealed bag).

In cases of ingestion, anticipate emesis, which will be highly contaminated.

Consider contacting Poison Information Center (1-800-222-1222) or seek assistance of HazMat Medic.

If treating 1 to 5 patients:

- If patient is seizing,
 - Administer **midazolam (versed)** 0.05 mg/kg slow IV/IO/IN bolus maximum dose 5 mg) titrated to cessation of seizure activity. Repeat once prn. (Refer to Seizure-Adult Protocol 5.7), or
 - in the multi/mass-casualty setting **diazepam (valium)** 10 mg IM via auto injector
- If patient is experiencing eye pain and/or blepharospasm, administer **tetracaine** 1 drop in each eye.

If treating more than 5 patients or self-exposure (with PINPOINT PUPILS):

- Administer **Doudote®** (single autoinjector containing **atropine** 2.1 mg and 600 mg **pralidoxime chloride**) or **Mark I kit(s)** (two auto injectors; one containing **atropine** 2mg and one containing **pralidoxime chloride** 600mg)
 - For early symptoms (severe rhinorrhea or mild to moderate dyspnea), administer one (1) Doudote® or Mark I auto injector kit. If no improvement in patient's status in 10 minutes, administer another Doudote ® or Mark I auto injector kit.
 - For severe respiratory distress, coma, or seizures, administer three (3) Doudote® or Mark I auto injectors and one (1) CANA auto injector (**diazepam** 10mg IM). (c) (d)

Special Notes

- Insure good field decontamination prior to transport

HAZMAT or TOXMEDIC

If treating 1 – 5 patients

- If the patient is bradycardic, has excessive pulmonary secretions, administer **atropine** 0.03 mg/kg IV (2mg/70kg). Repeat every 5 minutes until pulmonary secretions dry.
- If advised by Poison Information Center, every other dose of **atropine** can be increased to 0.06 mg/kg IV.
- End point for treatment is manifested by patient improvement with clear lung sounds.
- If Organophosphate, administer **pralidoxime hydrochloride (2-PAM) 1-2 gm mixed in 100 ml NS IV drip over 30 minutes**. In severe cases with nicotinic effects evidenced by fasciculations of large muscle, 2-PAM may be given IV at a maximum rate of 200 mg/minute or 1 gm/5 minutes. Monitor for hypotension.

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Cyanide	RED
Protocol Title	Color Code
Cyanide Salts (Potassium & sodium cyanide) Hydrogen Cyanide (HCN) Hydrocyanic acid (AC) Cyanogen chloride (CK) Azide Compounds	H-6
Covered Materials	Protocol No.

Cyanides and hydrogen sulfide both act by preventing aerobic metabolism at the cellular level. The effects are very rapid acting and progress from onset of weakness, unconsciousness, respiratory arrest and seizures.

Cyanides are commonly encountered in metal plating facilities, jewelry stores, metal recovery operations and the manufacture of other chemical compounds. Smoke inhalation in structural fires has been determined to be the largest source of cyanide poisoning in the United States and is Specifically addressed by Smoke Inhalation Protocol.

SIGNS AND SYMPTOMS

- **Cardiovascular** - Initially pulse decreases and BP rises. In later stages, possible tachycardia, dysrhythmias and cardiovascular collapse can occur; there may also be palpitations and/or chest tightness. SaO2 will generally be nearly 100%.
- **Respiratory** - Can cause immediate respiratory arrest, although initially there is usually an increase in the rate and depth of respirations; and later becoming slow and gasping, possible irritation of the respiratory tract, cough, dyspnea, tachypnea and pulmonary edema.
- **CNS** - Can cause immediate coma, although initially there is usually weakness, headache, and confusion; seizures are common.
- **GI** - nausea/vomiting, salivation may be profuse, possible garlic taste in mouth.
- **Skin** - pale, or reddish color.

Good Medical Supportive Care, including airway management, is paramount and should precede the use of the hydroxocobalamine or nitrite therapy (Cyanide antidote kit). However; the rapid administration of these medications will be the only therapy that will reverse the life-threatening symptoms.

SUPPORTIVE CARE

Follow general hazardous materials Treatment Protocol H-1

Rescuer self-protection is of extreme importance when dealing with cyanide and hydrogen sulfide exposures.

If patient was exposed externally, remove clothing and decontaminate as appropriate (place clothes in sealed bag).

Consider contacting Poison Information Center (1-800-222-1222) or seek assistance of HazMat Medic.

If the patient is conscious, administer **activated charcoal** 50 gm PO for oral ingestion if available.

If patient has dysrhythmias, treat PRN (refer to Protocol Sections 2 & 3).

If patient is seizing,

- a) administer **midazolam (versed)** 0.05 mg/kg slow IV/IO/IN bolus maximum dose 5 mg) titrated to cessation of seizure activity. Repeat once prn. (Refer to Seizure-Adult Protocol 5.7). **OR**
- b) in the multi/mass-casualty setting **diazepam (valium)** 10 Mg IM via auto injector is authorized

For Suspected Cyanide Poisoning

- If unconscious, administer sodium bicarbonate 1mEq/Kq IV.
- If Available, administer Hydroxocobalamine 5 grams IV over 15 minutes (2 vials, 2.5 grams each reconstituted with 100 ml) in accordance with manufacturer instructions enclosed within the Cyanokit®

HAZMAT or TOXMEDIC

For Cyanide poisoning in the mass casualty setting or with the absence or exhaustion of supplies of hydroxocobalamine, If patient is exhibiting life-threatening symptoms (altered LOC, respiratory compromise or arrest, shock, seizures, coma), administer the following medications (3 parts) in the following order (to induce methemoglobinemia).

- o **Amyl Nitrite** (break pearls into gauze sponge and hold under patient's nose or BVD intake valve) for 15 to 30 seconds of each minute, until iv is established and **sodium nitrite** solution is ready.

- **Sodium Nitrite** 10 ml of a 3% concentration (300 mg/10 ml) or 0.35 ml/kg up to a maximum of 10 ML at 2.5 to 5ml/minute IV
 - **Sodium Thiosulfate** 25% 12.5 gm (50 ml) IV
-
- Monitor methemoglobin levels by non-invasive means
 - For cyanide poisoning in the absence of hydroxocobalamine, when symptoms are not severe, or if diagnosis is not certain, omit amyl and sodium nitrite and only give **Sodium Thiosulfate**

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Hydrogen Sulfide	RED
Protocol Title	Color Code
Hydrogen sulfide Sulfides, Thioethers, Mercaptans & Thiols Sewer gas	H-7
Covered Materials	Protocol No.

Hydrogen sulfide acts by preventing aerobic metabolism at the cellular level in the same manner as cyanides. The effects are very rapid acting and progress from onset of weakness, unconsciousness, respiratory arrest and seizures.

Hydrogen sulfide (H₂S) is the leading cause of death in confined space accident involving sewers and waste water treatment systems. It has also been seen used as a novel method of suicide. The effects are identical to those of cyanide poisoning and, up until the approval of hydroxocobalamin, the treatment of H₂S poisoning and cyanide poison were virtually identical.

SIGNS AND SYMPTOMS

- **Cardiovascular** - Initially pulse decreases and BP rises. In later stages, possible tachycardia, dysrhythmias and cardiovascular collapse can occur; there may also be palpitations and/or chest tightness. SaO₂ will generally be nearly 100%.
- **Respiratory** - Can cause immediate respiratory arrest, although initially there is usually an increase in the rate and depth of respirations; and later becoming slow and gasping, possible irritation of the respiratory tract, cough, dyspnea, tachypnea and pulmonary edema.
- **CNS** - Can cause immediate coma, although initially there is usually weakness, headache, and confusion; seizures are common.
- **GI** - nausea/vomiting, salivation may be profuse, possible garlic taste in mouth.
- **Skin** - pale, or reddish color.

Good Medical Supportive Care, including airway management, is paramount and should precede the use of nitrite therapy (Cyanide antidote kit). However; the rapid administration of these medications will be the only therapy that will reverse the life-threatening symptoms.

SUPPORTIVE CARE

Follow general hazardous materials Treatment Protocol H-1

Rescuer self-protection is of extreme importance when dealing with cyanide and hydrogen sulfide exposures.

If patient was exposed externally, remove clothing and decontaminate as appropriate (place clothes in sealed bag).

Consider contacting Poison Information Center (1-800-222-1222) or seek assistance of HazMat Medic.

ALL PARAMEDICS

If patient has dysrhythmias, treat PRN (refer to Protocol Sections 2 & 3).

If patient is seizing,

a) administer **midazolam (versed)** 0.05 mg/kg slow IV/IO/IN bolus maximum dose 5 mg) titrated to cessation of seizure activity. Repeat once prn. (Refer to Seizure-Adult Protocol 5.7). **OR**

b) in the multi/mass-casualty setting **diazepam (valium)** 10 Mg IM via auto injector is authorized

For Suspected Hydrogen Sulfide poisoning

- 100% Oxygen by BVM or Non-rebreather, administer sodium bicarbonate 1mEq/Kg IV.
- Obtain HazMat Medic/Toxmedic assistance

HAZMAT or TOXMEDIC

If patient is exhibiting life-threatening symptoms (altered LOC, respiratory compromise or arrest, shock, seizures, coma), administer the following medications (2 parts) in the following order (to induce methemoglobinemia).

- o **Amyl Nitrite** (break pearls into gauze sponge and hold under patient's nose or BVD intake valve) for 15 to 30 seconds of each minute, until iv is established and **sodium nitrite** solution is ready.

- **Sodium Nitrite** 3% (300 mg/10 ml) 10 ml (or 0.35 ml/kg) at 2.5 to 5ml/minute IV.
- Monitor methemoglobin levels by non-invasive means

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Ethylene Glycol	Pink
Protocol Title	Color Code
Ethylene glycol Methanol Methyl alcohol	H-8
Covered Materials	Protocol No.

THE CLINICAL MANIFESTATIONS OF ETHYLENE GLYCOL POISONING

are described in three phases:

- **Phase 1** (30 minutes to 12 hours) - ethanol-like inebriation, metabolic acidosis, seizures, and coma.
- **Phase 2** (12 to 36 hours) - tachycardia, tachypnea, hypertension, pulmonary edema.
- **Phase 3** (36 to 48 hours) - crystalluria, acute tubular necrosis with oliguria and renal failure.

METHANOL EXPOSURE SIGNS AND SYMPTOMS

- **Cardiovascular** - dysrhythmias and hypotension.
- **Respiratory** - respiratory insufficiency or arrest, pulmonary edema, chemical pneumonitis and bronchitis.
- **CNS** - CNS depression and coma, seizures, headache, muscle weakness and delirium.
- **GI** - GI bleeding, nausea/vomiting, and diarrhea.
- **Eye** - chemical conjunctivitis.
- **Skin** - irritation to full thickness burns.

SUPPORTIVE CARE

1. Remove patient from hazardous area.
2. Follow General Illness Protocol 1.2.
3. **Consider contacting Poison Information Center (1-800-222-1222) or seek assistance of HazMat Medic.**

4. If patient is seizing, administer **midazolam (versed)** 0.05 mg/kg slow IV/IO/IN bolus maximum dose 5 mg) titrated to cessation of seizure activity. Repeat once prn. (Refer to Seizure-Adult Protocol 5.7)
5. If lungs are clear, administer **normal saline** @ 100 ml/hr IV.
6. If respiratory rate is twice normal rate, administer **sodium bicarbonate** 8.4% 1-2 mEq/kg IV.
7. If patient has dysrhythmias, treat PRN (refer to Protocol Sections 2 & 3).
8. Administer **thiamine** 100 mg IV.

Hydrofluoric Acid	Orange
Protocol Title	Color Code
H-F Vicane Acids used in glass itching	H-9
Covered Materials	Protocol No.

SIGNS AND SYMPTOMS

Include hypovolemic shock and collapse, tachycardia with weak pulse, acute pulmonary edema, asphyxia, chemical pneumonitis, upper airway obstruction with stridor, pain and cough, decreased LOC, nausea/vomiting, diarrhea, possible GI bleeding and possible blindness. HF also causes severe skin burns. The damage may be severe with no outward signs, except that the patient will complain of severe pain.

SUPPORTIVE CARE

1. Remove patient from hazardous area (a).
2. Follow General Illness Protocol 1.2 (Ipecac is contraindicated).
3. If patient was exposed externally, remove clothing and jewelry and decontaminate with copious amounts of water.
4. **Consider contacting Poison Information Center (1-800-222-1222) or seek assistance of TOXMEDIC/HAZMEDIC.**
5. If patient has pulmonary edema, maintain adequate ventilation and oxygenation, as well as providing pulmonary suction to remove fluid.
 - **Non-cardiogenic pulmonary edema should not be treated with furosemide (lasix), but with positive end expiratory pressure (PEEP) or CPAP mask (Airway Management Procedure 7.1).**

PARAMEDICS

6. If patient has burns to eye(s): Immediately flush with copious amounts of water or normal saline.
7. If Patient has burns to the skin, immediately flush with copious amounts of water

8. For inhalation exposures, immediately support ventilations.
9. Be prepared for cardiac complications of hypocalcemia. If patient has dysrhythmias, provide additional treatment PRN (refer to Protocol Sections 2 & 3).

HAZMAT or TOXMEDIC

10. If patient has burns to the eye(s):
 - Prepare an eye wash solution by mixing **calcium gluconate** if available (10%) 50 ml in NS 500 ml (b).
 - Apply **calcium gluconate** eyewash if available using the Morgan Therapeutic Lens and continue until arrival at receiving facility (b).
11. If patient has burns to the skin:
 - Prepare skin gel by mixing **calcium gluconate** if available(10%) 10 ml into a 2 oz tube of KY jelly (making a 2.5% gel)(b).
 - Apply a 2.5% **calcium gluconate** Gel if available on burned area.
 - For burns to hand(s) place hand in glove filled with this gel.
12. For inhalation injury:
 - Immediately support ventilations. **Calcium Gluconate** if available (10%) 1 ml mixed with 3 ml NS via nebulizer.
 - For severe respiratory depression/arrest and/or cardiac toxicity dysrhythmia – prolonged QT interval, hypotension), administer **Calcium Gluconate** if available (10%) 1-2 g slow IV over 5 minutes (b).
 - If systemic symptoms persist, repeat **Calcium Gluconate** if available (10%) 1-2 g slow IV over 5 minutes (b).

Phosphine	Purple
Protocol Title	Color Code
Phosphine gas Metal phosphides Phosphide salts	H-10
Covered Materials	Protocol No.

PHOSPHINE EXPOSURE SIGNS AND SYMPTOMS

- **Cardiovascular** - cardiovascular collapse with weak and rapid pulse. It can show a reflex bradycardia.
- **Respiratory** - a mild and transient cough is the only symptom at the time of exposure to most agents. A delayed onset of dyspnea, tachypnea, violent coughing and pulmonary edema follows. Some agents work immediately on the upper airway, resulting in pain and choking, spasm of the glottis, temporary reflex arrest of breathing and possible upper airway obstruction spasm or edema of the glottis.
- **CNS** - fatigue, restlessness, and decreased LOC are usually delayed signs.
- **GI** - burning of the mucous membranes, nausea/vomiting, and abdominal pain.
- **Eye** - chemical conjunctivitis.
- **Skin** - irritation of moist skin areas, pallor and cyanosis.

Note: symptoms may be immediate or may be delayed for 5 to 72 hours.

SUPPORTIVE CARE

1. Remove patient from hazardous area (a).
2. Avoid exposure to vapor emitting from soaked clothes.
3. Follow General Illness Protocol 1.2, administer 100% high-flow oxygen (Ipecac is contraindicated).
4. If patient was exposed externally, remove clothing and decontaminate as appropriate (do not use water as an initial irrigating solution for phosphine exposure due to possible reactivity).
5. Provide ocular irrigation as indicated with normal saline and Morgan Therapeutic Lens.

6. For Phosphine ingestion, administer **Activated Charcoal** 50 gm PO if available.
7. If patient has pulmonary edema, maintain adequate ventilation and oxygenation, as well as providing pulmonary suction to remove fluid. **Non-cardiogenic pulmonary edema should not be treated with furosemide (lasix), but with positive end expiratory pressure (PEEP) or CPAP mask (Airway Management Procedure 7.1).**

PARAMEDICS

1. If patient is seizing, administer **midazolam (versed)** 0.05 mg/kg slow IV/IO/IN bolus maximum dose 5 mg) titrated to cessation of seizure activity. Repeat once prn. (Refer to Seizure-Adult Protocol 5.7)
2. If patient has dysrhythmias, treat PRN (refer to Protocol Sections 2 & 3).

Note:

- (a) Insure personnel are using appropriate PPE.
Obtain Hazardous Materials Team assistance.

Phenol	White
Protocol Title	Color Code
Phenol Phenyl Alcohol Carbolic acid	H-11
Covered Materials	Protocol No.

SIGNS AND SYMPTOMS

Include nausea/vomiting, diarrhea, excessive sweating, headache, dizziness, ringing in the ears, seizures, loss of consciousness, coma, respiratory depression, inflammation of the respiratory tract, shock and death. Exposure to skin can result in severe burns, which will cause the skin to have a white, red or brown appearance. Failure to decontaminate the skin may allow the Phenol to absorb into the system and result in death.

SUPPORTIVE CARE

1. Remove patient from hazardous area (a).
2. Avoid exposure to vapor emitting from soaked clothes.
3. General Illness Protocol 1.2 (Ipecac is contraindicated).
4. If patient was exposed externally, remove clothing and decontaminate with copious amounts of water.
 - After thoroughly rinsing skin, apply **vegetable oil** or **mineral oil** or **Polyethylene glycol** (PEG) to exposed areas. (Isopropyl alcohol may be used for very small skin burns only.)
 - Provide ocular irrigation with normal saline with Morgan Therapeutic Lens.
5. **Consider contacting Poison Information Center (1-800-222-1222) or seek assistance of TOXMEDIC/HAZMEDIC.**

PARAMEDICS

1. Assess need for intubation (Medical Procedure 4.20 and 4.28).
2. If patient is seizing, administer **midazolam (versed)** 0.05 mg/kg slow IV/IO/IN bolus maximum dose 5 mg) titrated to cessation of seizure activity. Repeat once prn. (Refer to Seizure-Adult Protocol 5.7)

Notes:

- (a) If risk of exposure from fumes is high, call HAZMAT team.
 - (b) **Refer to appropriate Hazmat PPE protocol, as the risk of secondary contamination is very high.**

Technical Protocol

Morgan Lenses

Indications:

Use of Morgan Therapeutic Lens (Morgan Lens) are indicated for the irrigation of eyes which have been contaminated by chemicals including acids and alkaline materials.

Steps for Use:

Instill Tetracaine (1 – 2 drops) topical anesthetic into each eye to be irrigated. Tetracaine is contraindicated in cases of allergies to caines and or injuries to the eye resulting in perforation of the globe.

Connect Morgan lens to Saline IV administration system set at 10 gtts/ml







Start flow of saline, have patient look down and insert lens under the under the upper lid. Then have patient look up and retract the lower lid to allow lens to “drop” in.

Secure tubing with tape to the forehead.

For **acid burns and chemical contamination flush with 500ml at a rapid rate.** Reassess and continue flushing at 50 ml/hr (8 – 10 gtts/min) as long as tolerated by patient.

For alkaline burns, flush with **2000ml at rapid rate then reduce to 50 ml/hr (8 to 10 gtts/min macro)** and continue irrigation throughout transport.

Morgan Lens Application

		
<p>Step 1: Insertion: Instill 1 to 2 drop tetracaine topical anesthetic unless contraindicated.</p>	<p>Step 2: Attach Morgan Lens Delivery Set to IV setup. Start the flow.</p>	<p>Step 3: Have patient look down, Insert Morgan Lens under upper eye lid. Have patient look up, retract lower lid, drop lens in place.</p>
		
<p>Step 4: Release the lower lid over Morgan lens and adjust flow.</p>	<p>Step 5: Removal: Continue flow, have patient look up, retract lower lid – hold position.</p>	<p>Step 6: Slide Morgan lens out and terminate flow.</p>

Situation	Flow Rate	Frequency
Ocular injury due to acid burns or solvents, gasoline, detergents, etc.	500 ml rapid/free flow. Reassess and continue at slower rate.	Once. Repeat as necessary.
Alkali burns	2000 ml rapid/free flow. Reassess. Continue at 50 ml/hour or 15 drops/minute.	Continuous until pH of cul-de-sac is returned to neutrality.
Non-embedded foreign bodies	500 ml rapid/free flow. Reassess and continue at slower rate.	Once. Repeat as necessary.
Foreign body sensation with no visible foreign body	20 ml slowly without force.	Once. Repeat once if necessary.

(Source: MorTran , Inc. “Morgan lens”®)

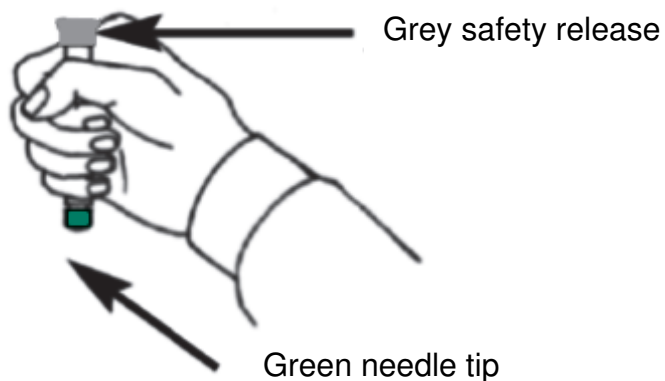
Technical Protocol

DuoDote™ Autoinjector

1) Tear open plastic pouch at any of the notches. Remove the DuoDote® Autoinjector.



2) Place the DuoDote® autoinjector in your dominate hand. Firmly grip the autoinjector with the green tip pointing down. **NEVER TOUCH THE GREEN TIP> THAT IS THE NEEDLE END.**



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MEDICATION INFORMATION CARD	
MEDICATION:	Activated Charcoal
INDICATIONS:	
CONTRAINDICATIONS:	
DOSE:	Adult
	Pediatric
SIDE EFFECTS:	
NOTES:	

MEDICATION INFORMATION CARD	
MEDICATION:	Amyl Nitrate
INDICATIONS:	
CONTRAINDICATIONS:	
DOSE:	Adult
	Pediatric
SIDE EFFECTS:	
NOTES:	

MEDICATION INFORMATION CARD	
MEDICATION:	Atropine
INDICATIONS:	
CONTRAINDICATIONS:	
DOSE:	Adult
	Pediatric
SIDE EFFECTS:	
NOTES:	

MEDICATION INFORMATION CARD	
MEDICATION:	Calcium Gluconate
INDICATIONS:	
CONTRAINDICATIONS:	
DOSE:	Adult
	Pediatric
SIDE EFFECTS:	
NOTES:	

MEDICATION INFORMATION CARD	
MEDICATION:	Diazepam (Autoinjector)
INDICATIONS:	
CONTRAINDICATIONS:	
DOSE:	Adult
	Pediatric
SIDE EFFECTS:	
NOTES:	

MEDICATION INFORMATION CARD	
MEDICATION:	Hydroxocobalamine (B12a)
INDICATIONS:	
CONTRAINDICATIONS:	
DOSE:	Adult
	Pediatric
SIDE EFFECTS:	
NOTES:	

MEDICATION INFORMATION CARD	
MEDICATION:	Methylene Blue
INDICATIONS:	
CONTRAINDICATIONS:	
DOSE:	Adult
	Pediatric
SIDE EFFECTS:	
NOTES:	

MEDICATION INFORMATION CARD	
MEDICATION:	Sodium Bicarbonate
INDICATIONS:	
CONTRAINDICATIONS:	
DOSE:	Adult
	Pediatric
SIDE EFFECTS:	
NOTES:	

MEDICATION INFORMATION CARD	
MEDICATION:	Sodium Nitrite
INDICATIONS:	
CONTRAINDICATIONS:	
DOSE:	Adult
	Pediatric
SIDE EFFECTS:	
NOTES:	

MEDICATION INFORMATION CARD	
MEDICATION:	Sorbitrol
INDICATIONS:	
CONTRAINDICATIONS:	
DOSE:	Adult
	Pediatric
SIDE EFFECTS:	
NOTES:	

MEDICATION INFORMATION CARD

MEDICATION:	Sodium Thiosulfate
INDICATIONS:	
CONTRAINDICATIONS:	
DOSE:	Adult
	Pediatric
SIDE EFFECTS:	
NOTES:	

MEDICATION INFORMATION CARD

MEDICATION:	Thiamine
INDICATIONS:	
CONTRAINDICATIONS:	
DOSE:	Adult
	Pediatric
SIDE EFFECTS:	
NOTES:	