



**University Hospitals**

EMS Training & Disaster  
Preparedness Institute

**Hazardous Materials  
Protocol and  
Treatment Guidelines**

**2020 R1**

# HAZ - MAT PROTOCOLS

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# Section 1 Haz-Mat General

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# GENERAL HAZ-MAT PROTOCOL

OVERARCHING PRIORITY: The Safety of the Public and Emergency Response Personnel

Request appropriate resources (Fire/Police/Hazmat) to provide for scene control, hazard control, PPE, decontamination, patient care needs and scene security

If possible, identify the type, quantity and hazard potential of the material.  
Relay the info to other responders, as appropriate

Prevent further exposure and contamination thru isolation, evacuation and hazard control

Donn appropriate PPE based upon the hazards

Rapidly remove the victim from the hazardous environment, if safe to do so

If patient has potential contamination, perform Emergency Decontamination.  
Water is the universal decon solution for human skin. Use copious amounts of low-pressure water

Attempt to determine the specific chemical involved. Information can often be obtained onsite or from Technical Information Resources

Following Decontamination, Assess Patient following the Universal Patient Care Protocol

If appropriate, follow other specific hazmat treatment protocols

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**SPECIAL CONSIDERATIONS****Aeromedical Transport**

Aeromedical transport of chemical injury patients is only appropriate when:

- There is medical justification for transport by air
- The patient has been thoroughly and completely decontaminated
- There is no chance that the patient poses a secondary respiratory threat which could adversely affect the crew during flight
- The flight crew has been notified of the exposure and agrees to the plan

**General Hazmat Patient Care**

- Assess safety of the treatment area
- Assure contaminated patients have been thoroughly decontaminated before treatment or transport
- Wear appropriate PPE based upon the potential hazards of the product
- Assess and address potential for secondary contamination and/or respiratory threat
- Treat life-threatening injuries or conditions as they are found
  - Airway, shock, bleeding control, trauma, cardiovascular compromise
- Assess for findings consistent with toxidromes and pre-existing conditions with potential for exacerbation, accompanying trauma, and/or burns
- Assess body systems
- Obtain medical history
- Evaluate vital signs, reassess frequently
- Monitor cardiac rhythm, obtain 12 lead
- Assign treatment priority and make transport decision
- Establish IV access (in undamaged tissue, if possible)
- Contact Medical Control and advise receiving hospital

**Poisoning Treatment Paradigm**

- Alter absorption
- Antidote administration
- Basics
- Change catabolism
- Distribute differently
- Enhance elimination

**EMERGENCY DECONTAMINATION**

Is there evidence or suspicion that the patient was contaminated with a Hazardous Chemical?

YES

NO

Immediately flush the contaminated area  
Of the patient with copious amounts  
of low pressure, tepid water (tepid water is preferred if available)  
Isolate patient and control run-off if possible

Remove and bag clothing, jewelry and  
personal items.  
Ambulatory patients may undress themselves

Have ambulatory patients  
remove and bag their clothing

Wet, Strip and Flush with  
copious amounts of low-pressure water

Treat life-threatening injuries as they are found  
No invasive procedures in decon  
Assist breathing and bleeding control only  
Flush and cover wounds

If acid or alkali, continue to flush the affected  
area with water for 15-20 minutes

Protect patient from hypothermia

Begin Medical Evaluation and Treatment PER EMS PROTOCOL

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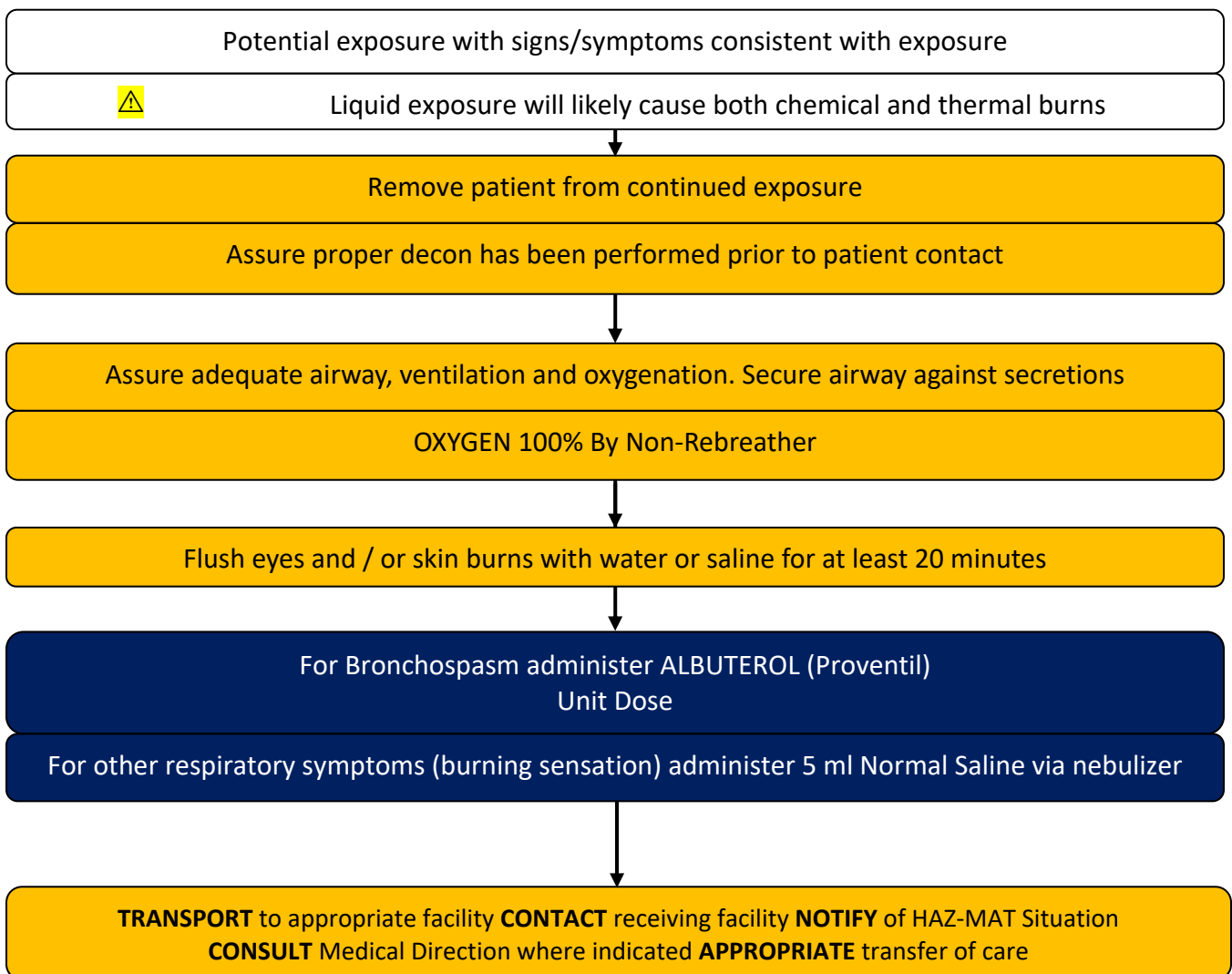
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## AMMONIA AND OTHER ALKALINE GAS EXPOSURES

PATHOPHYSIOLOGY AND ROUTES	SIGNS AND SYMPTOMS	SOURCES AND USES
<p>Anhydrous ammonia is found in liquid and gaseous forms. Reacts with water to form ammonium hydroxide. Also found in solution with water in various concentrations. Strong characteristic odor.</p> <p><b>Inhalation</b> <b>Skin and Eye Absorption</b> <b>Ingestion</b></p>	<ul style="list-style-type: none"> <li>• Wheezing and cough</li> <li>• Difficulty Breathing</li> <li>• Burning sensation to the upper airway</li> <li>• Lacrimation and severe painful irritation of eyes</li> <li>• Acute or delayed non-cardiogenic pulmonary edema</li> <li>• Skin burns, frostbite from liquefied gas exposure</li> </ul>	<ul style="list-style-type: none"> <li>• Fertilizer</li> <li>• Industrial refrigeration systems</li> <li>• Manufacturing</li> <li>• Illicit drug labs</li> <li>• Blue print production</li> <li>• Water treatment</li> <li>• Pharma and petrochemical</li> </ul> <p><b>NOTE: Ammonia is very water soluble</b></p>

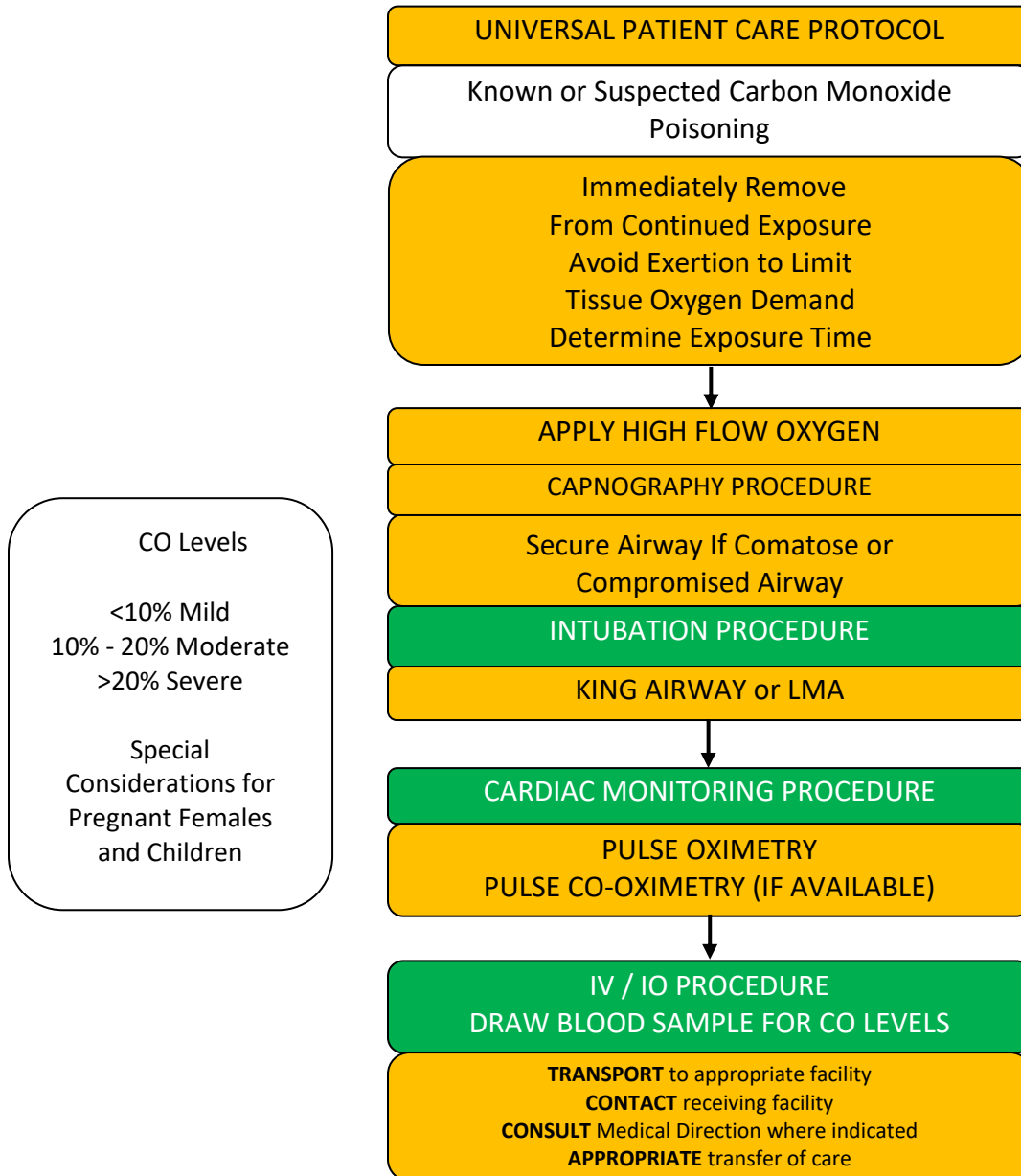


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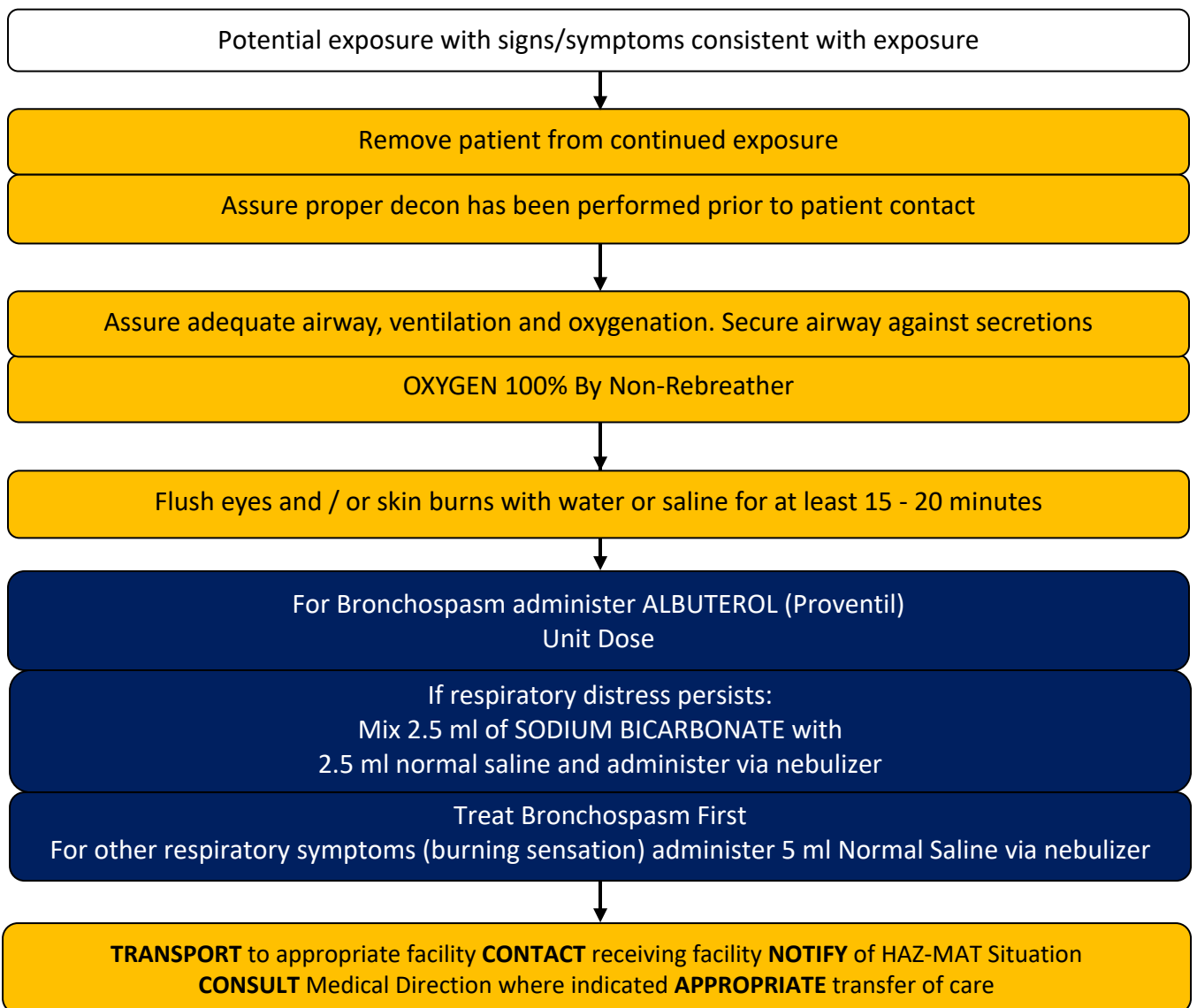
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**CARBON MONOXIDE**

**CHLORINE, CHLORAMINE AND ACID GASES (OTHER THAN HF)**

PATHOPHYSIOLOGY AND ROUTES	SIGNS AND SYMPTOMS	SOURCES AND USES
<p>Chlorine is found in liquid and gaseous forms. Reacts with water to form hydrochloric acid and hypochlorous acid. Greenish-yellow gas with characteristic odor. Phosgene (COCl<sub>2</sub>) and Nitrogen Dioxide (NO<sub>2</sub>) are related compounds</p> <p style="text-align: center;"><b>Inhalation</b> <b>Skin and Eye Absorption</b> <b>Ingestion</b></p>	<ul style="list-style-type: none"> <li>• Wheezing</li> <li>• Difficulty Breathing</li> <li>• Burning sensation to the upper airway</li> <li>• Hoarseness and cough</li> <li>• Lacrimation and severe painful irritation of eyes</li> <li>• Acute or delayed non-cardiogenic pulmonary edema</li> </ul>	<ul style="list-style-type: none"> <li>• Pool chemicals</li> <li>• Concrete cleaning chemicals</li> <li>• Muriatic Acid</li> <li>• Water treatment</li> <li>• Paper mills</li> <li>• Pharmaceutical manufacturing</li> <li>• Manufacturing paper products, plastics, dyes, textiles, medicines, antiseptics, insecticides, solvents and paints</li> </ul>



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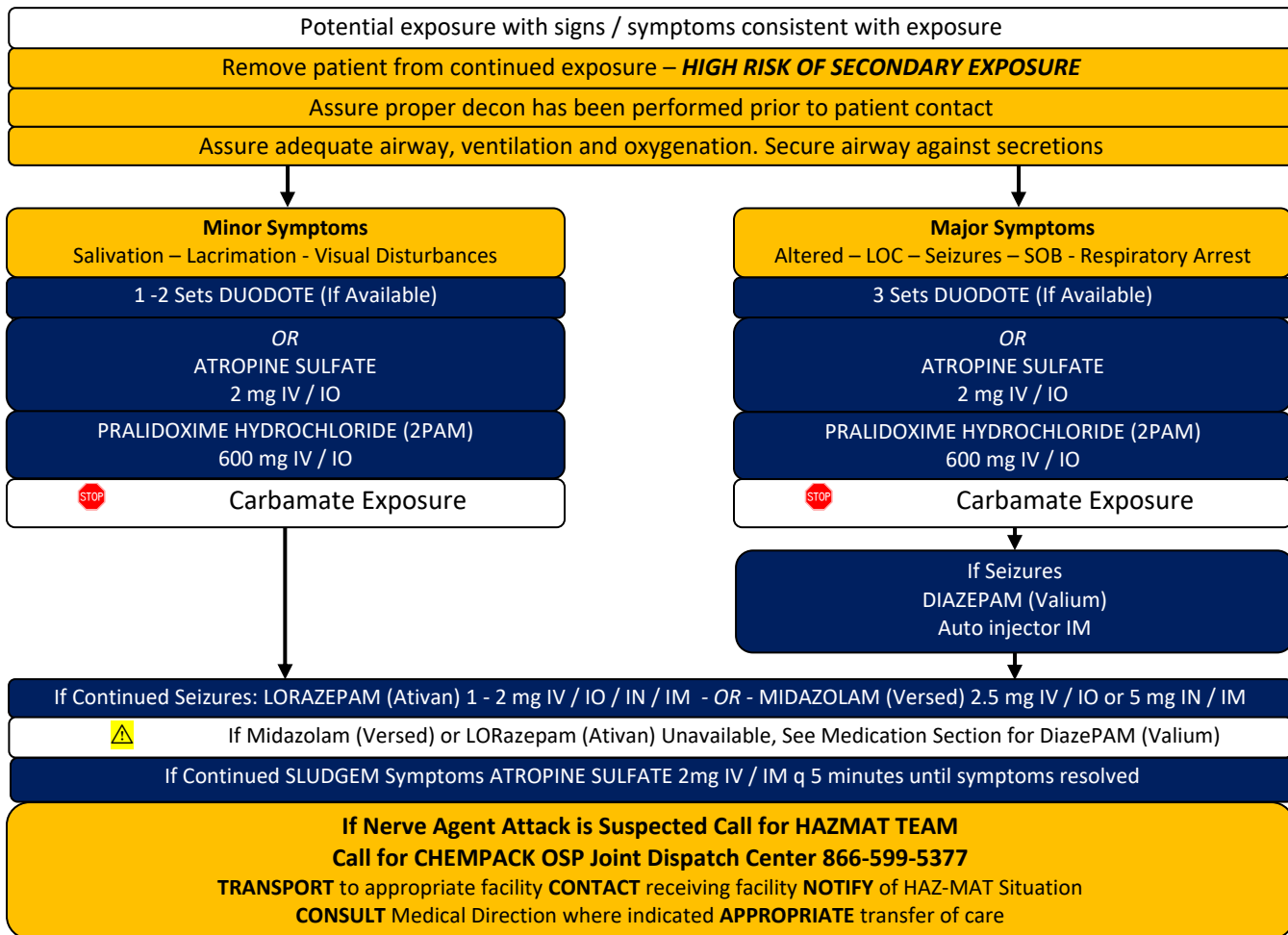
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# CHOLINESTERASE INHIBITOR EXPOSURE

PATHOPHYSIOLOGY AND ROUTES	SIGNS AND SYMPTOMS	SOURCES AND USES
Organophosphates, carbamates and nerve agents block acetylcholinesterase causing overstimulation of glandular secretions and skeletal muscle contractions  <p style="text-align: center;"><b>Inhalation</b> <b>Skin Absorption</b> <b>Ingestion</b></p>	<ul style="list-style-type: none"> <li>• Salivation</li> <li>• Runny Nose</li> <li>• Airway secretions</li> <li>• Bronchitis / Chest tightness</li> <li>• Lacrimation</li> <li>• Urination / Defecation</li> <li>• Nausea / Vomiting</li> <li>• Miosis (pinpoint pupils)</li> <li>• Seizures</li> <li>• Fasciculation (twitching)</li> <li>• Altered LOC / Coma</li> </ul>	<ul style="list-style-type: none"> <li>• Malathion</li> <li>• Parathion</li> <li>• Ethion</li> <li>• Bendiocarb</li> <li>• Aldicarb</li> <li>• Sarin, Soman, Tabun</li> <li>• GA, GB, GD</li> <li>• VX</li> </ul>



PATHOPHYSIOLOGY AND ROUTES	PEDIATRIC DOSING	PRECAUTIONS
<ul style="list-style-type: none"> <li>• Carefully evaluate patients to ensure they are not exposure to another agent (e.g. narcotics, vesicants, etc.)</li> <li>• For patients with major symptoms, there is no limit for Atropine dosing.</li> <li>• If ingestion has occurred, exposure may continue for some time due to slow absorption from the lower bowel.</li> </ul>	<p style="text-align: center;">Infants and Young Children Up to 20 kg ATROPINE SULFATE 0.02 mg / kg IV or 0.05 mg / kg IM q 5 min Until secretions decrease</p> <p style="text-align: center;">PRALIDOXIME HYDROCHLORIDE (2-PAM) 25 - 50 mg / kg IV / IM</p> <p style="text-align: center;">DIAZEPAM (Valium) 0.2 mg / kg IV or 0.5 mg/kg IM / PR Max total dose 5 mg</p>	<ul style="list-style-type: none"> <li>• Vesicant Exposure (e.g. Mustard, blister agents, etc.)</li> <li>• Respiratory irritant exposure (e.g. hydrogen sulfide, ammonia, chlorine, etc.)</li> <li>• These medications are only effective in treating OP exposure and will NOT be effective for exposures to Vesicants and/or Respiratory irritants</li> </ul>

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**CYANIDE ANTIDOTE KIT**

Patient already treated by CYANIDE EXPOSURE protocol  
NOT FOR SMOKE INHALATION TREATMENT

**AMYL NITRITE by Inhalation**

Break ampoule and hold under patient's nose for 30 seconds and then 100% O<sub>2</sub> for 30 seconds  
Alternating, not to exceed 3 minutes while IV access is established



If pt. is not breathing, Administer via BVM by inhalation – Place ampoule in mask

**SODIUM NITRITE**

As soon as IV access is established  
300 mg in 10 ml of 3% solution  
IV SLOW over 5 minutes to avoid hypotension



CONTRAINDICATED in cases of Smoke inhalation or Carbon Monoxide Poisoning

**SODIUM THIOSULFATE**

12.5 gm in 50 ml of 25% solution  
IV SLOW over 10 - 20 minutes to avoid hypotension

**TRANSPORT** to appropriate facility **CONTACT** receiving facility **NOTIFY** of HAZ-MAT Situation  
**CONSULT** Medical Direction where indicated **APPROPRIATE** transfer of care

PRECAUTIONS	PEDIATRIC DOSING	SIDE EFFECTS
<ul style="list-style-type: none"> <li>Hydrogen Cyanide by inhalation is one of the most rapidly acting poisons</li> <li>Pulse oximetry will be unreliable, usually indicating incorrect high readings</li> <li>Amyl Nitrite is a temporizing measure only and may be bypassed once IV access is obtained. Do not allow this step to delay IV access</li> </ul>	<p><b>SODIUM NITRITE</b> 0.2 ml / kg of a 3% solution administered IV SLOW over 5 minutes Max dose is 300 ml</p> <p><b>SODIUM THIOSULFATE</b> 1 ml / kg of 25% solution administered IV SLOW over at 10-20 minutes Max dose is 50 ml</p>	<ul style="list-style-type: none"> <li>Hypotension</li> <li>Methemoglobin formation</li> <li>Hypoxia</li> <li>Palpitations</li> <li>Dysthymias</li> <li>Tachypnea</li> </ul>

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**CYANIDE EXPOSURE**

PATHOPHYSIOLOGY AND ROUTES	SIGNS AND SYMPTOMS	SOURCES AND USES
<p>Cyanide interferes with the uptake of oxygen into cells halting cellular respiration and causing chemical asphyxiation.</p> <p><b>Skin absorption</b> <b>Ingestion</b> <b>Inhalation</b></p>	<ul style="list-style-type: none"> <li>• Headache</li> <li>• Nausea/vomiting</li> <li>• Tachypnea</li> <li>• Tachycardia/Bradycardia</li> <li>• Hypotension</li> <li>• Dizziness, weakness, restlessness</li> <li>• Altered LOC</li> <li>• Seizures</li> <li>• Coma</li> </ul>	<ul style="list-style-type: none"> <li>• Cyanogen Chloride</li> <li>• Hydrogen Cyanide</li> <li>• Electroplating</li> <li>• Smoke Inhalation from synthetic products</li> </ul>

Potential exposure with signs/symptoms consistent with exposure

Remove patient from continued exposure

Assure proper decon has been performed prior to patient contact

Take precautions against secondary contamination from bodily fluids and offgassing from GI tract  
If ingested

Assure adequate airway, ventilation and oxygenation. Secure airway against secretions

Establish 2 large bore IV's in non-exposed areas if possible  
20 ml / kg Normal Saline if Hypotensive

**CYANOKIT (HYDROXOCOBALAMIN)**  
See Antidote Protocol

**OR**

**CYANIDE ANTIDOTE KIT**  
NOT for use with Smoke Inhalation  
See Antidote protocol

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**CYANOKIT (HYDROXOCOBALAMIN) ADMINISTRATION**

Patient already treated by CYANIDE EXPOSURE protocol

**CYANOKIT (HYDROXOCOBALAMIN)**  
 Reconstitute medication with 200 ml of Normal Saline (or to fill line)  
 Mix thoroughly but do not shake  
 5 grams IV drip SLOW over 15-20 minutes  
 Monitor for hypotension

Consider **SODIUM THIOSULFATE**  
 12.5 gm in 50 ml of 25% solution  
 IV SLOW over 10-20 minutes to avoid hypotension

**TRANSPORT** to appropriate facility **CONTACT** receiving facility **NOTIFY** of HAZ-MAT Situation  
**CONSULT** Medical Direction where indicated **APPROPRIATE** transfer of care

PRECAUTIONS	PEDIATRIC DOSING	SIDE EFFECTS
<ul style="list-style-type: none"> <li>Hydrogen Cyanide by inhalation is one of the most rapidly acting poisons</li> <li>Pulse oximetry will be unreliable, usually indicating incorrect high readings</li> <li>Consider blood draw prior to administration as medication may make colormetric testing unreliable</li> </ul>	<p>Infant/Toddler (0-2 yrs) .625 gm</p> <p>Preschool (3-5 yrs) 1.25 grams</p> <p>Grade School (6-13 yrs) 2.5 gm</p> <p>=&gt; 14 years – 5 grams</p>	<ul style="list-style-type: none"> <li>Possible allergic reaction</li> <li>Eye irritation, redness, swelling</li> <li>ABD pain, nausea, vomiting</li> <li>Chest discomfort</li> <li>Dizziness, restlessness</li> <li>Dyspnea, tight throat</li> <li>Skin flushing, uticaria</li> </ul>

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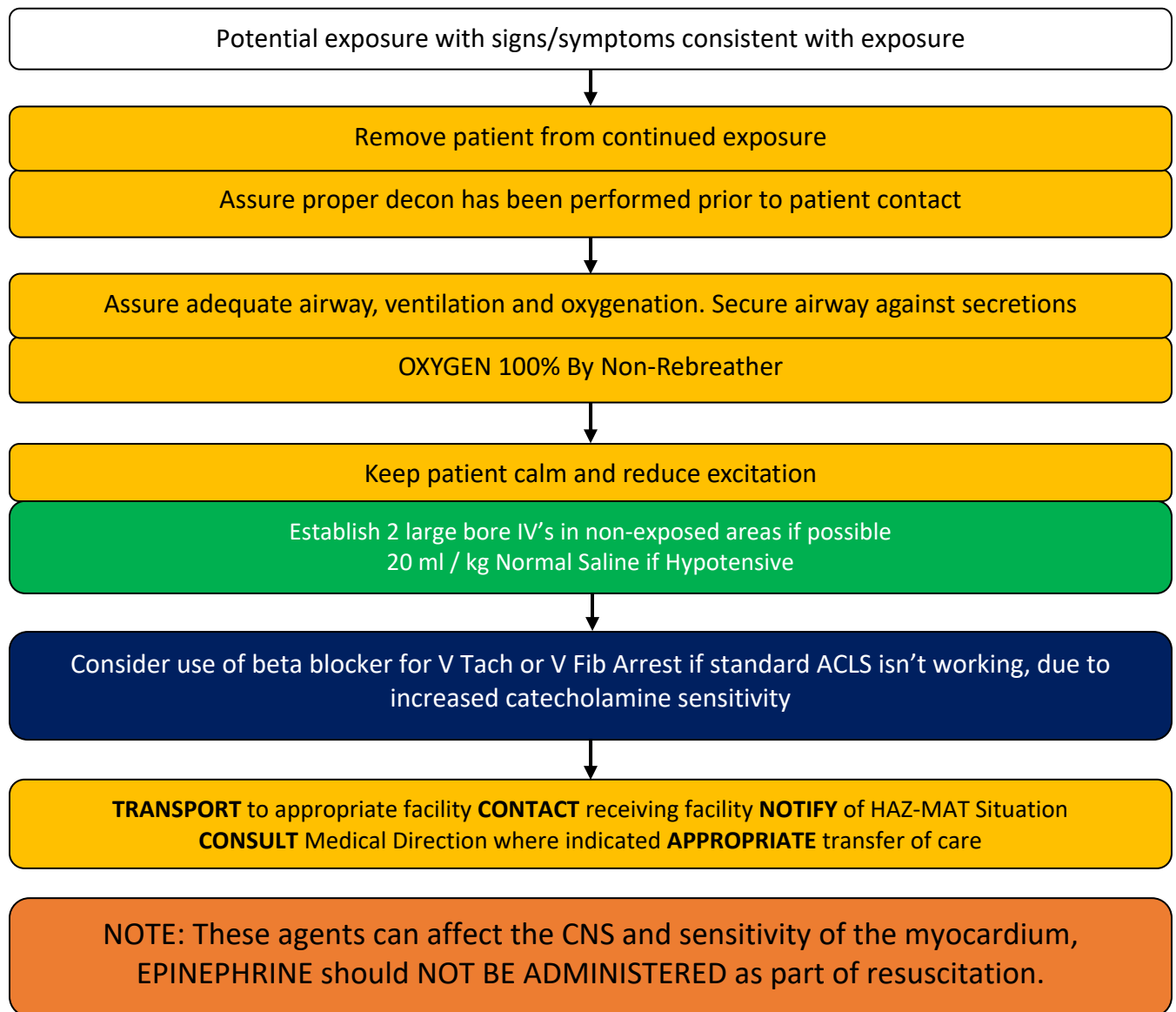
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## HYDROCARBONS AND HALOGENATED HYDROCARBONS

PATHOPHYSIOLOGY AND ROUTES	SIGNS AND SYMPTOMS	SOURCES AND USES
<p>Significant inhalation can depress CNS, producing an anesthetic-like state with coma and death. Sensitizes the myocardium to the effects of epinephrine and catecholamines. Chemical burns to skin with prolonged contact.</p> <p style="text-align: center;"><b>Inhalation</b> <b>Skin and Eye Absorption</b> <b>Ingestion</b></p>	<ul style="list-style-type: none"> <li>• Difficulty breathing</li> <li>• Altered level of consciousness</li> <li>• Stupor/lethargy/confusion</li> <li>• Coma and Death</li> <li>• Seizures</li> <li>• Excitation followed by CNS depression</li> <li>• Tachycardia/Dysrhythmias</li> <li>• Hypotension</li> <li>• Wheezing</li> <li>• Increased sensitivity to catecholamines</li> <li>• Delayed non-cardiogenic pulmonary edema</li> </ul>	<ul style="list-style-type: none"> <li>• Hydrocarbons: Methane, Propane, Gasoline, Mineral Spirits, Kerosene, Turpentine and Pine Tar</li> <li>• Aromatic Hydrocarbons: Benzene, Toluene, Xylene</li> <li>• Halogenated Hydrocarbons: Chloroform, Ethyl Chloride, Methylene Chloride and Trichloroethane</li> </ul>



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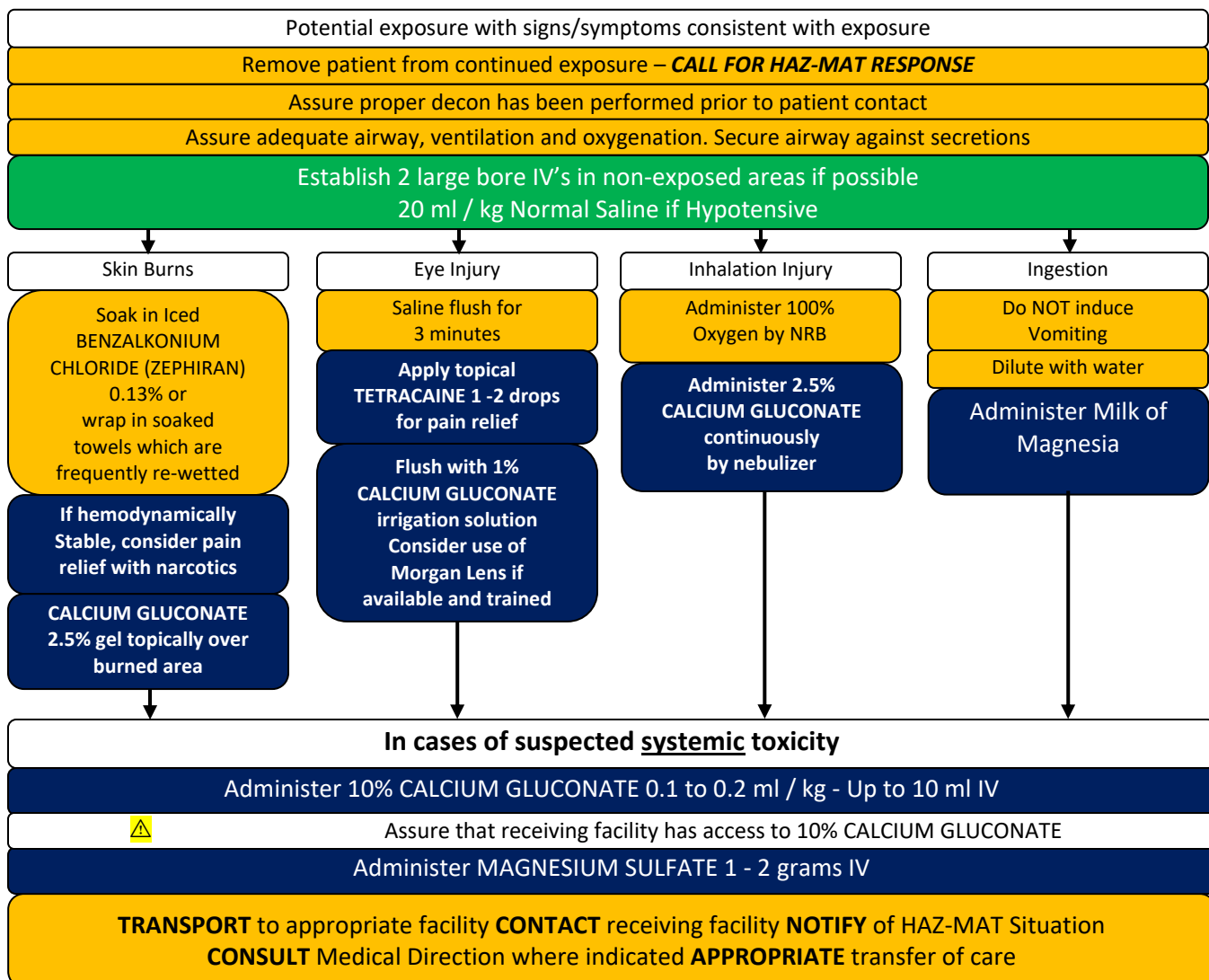
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# HYDROGEN FLUORIDE EXPOSURE

PATHOPHYSIOLOGY AND ROUTES	SIGNS AND SYMPTOMS	SOURCES AND USES									
<p>Gas or liquid can cause corrosive burns to skin and deep underlying tissue. Also binds to calcium and magnesium of nerve pathways, bone and blood stream resulting in symptoms of depolarization producing excruciating pain and cardiac dysthymias</p> <p><b>Inhalation</b> <b>Skin Absorption</b> <b>Ingestion</b></p>	<ul style="list-style-type: none"> <li>Corrosive burns</li> <li>Erythema</li> <li>Excruciating pain</li> <li>Respiratory burns</li> <li>Pulmonary Edema</li> <li>Cardiac Dysthymia due to hypocalcemia</li> <li>Hypomagnesemia</li> <li>Seizures</li> <li>ST segment abnormalities</li> <li>Symptoms may take hours to present</li> </ul>	SOURCES AND USES			<ul style="list-style-type: none"> <li>Hydrogen Fluoride</li> <li>Hydrofluoric acid</li> <li>Industrial ceramic production</li> <li>Glass etching</li> </ul>			SPECIAL PRECAUTIONS			<ul style="list-style-type: none"> <li>Hydrofluoric acid can cause serious, painful burns of the skin. Specialized medical treatment is required.</li> <li>Burns larger than 25 square inches may result in serious systemic toxicity.</li> <li>Hydrofluoric acid is a highly corrosive acid which can severely burn skin, eyes and mucous membranes. Vapors can also burn other tissues</li> </ul>
		SOURCES AND USES									
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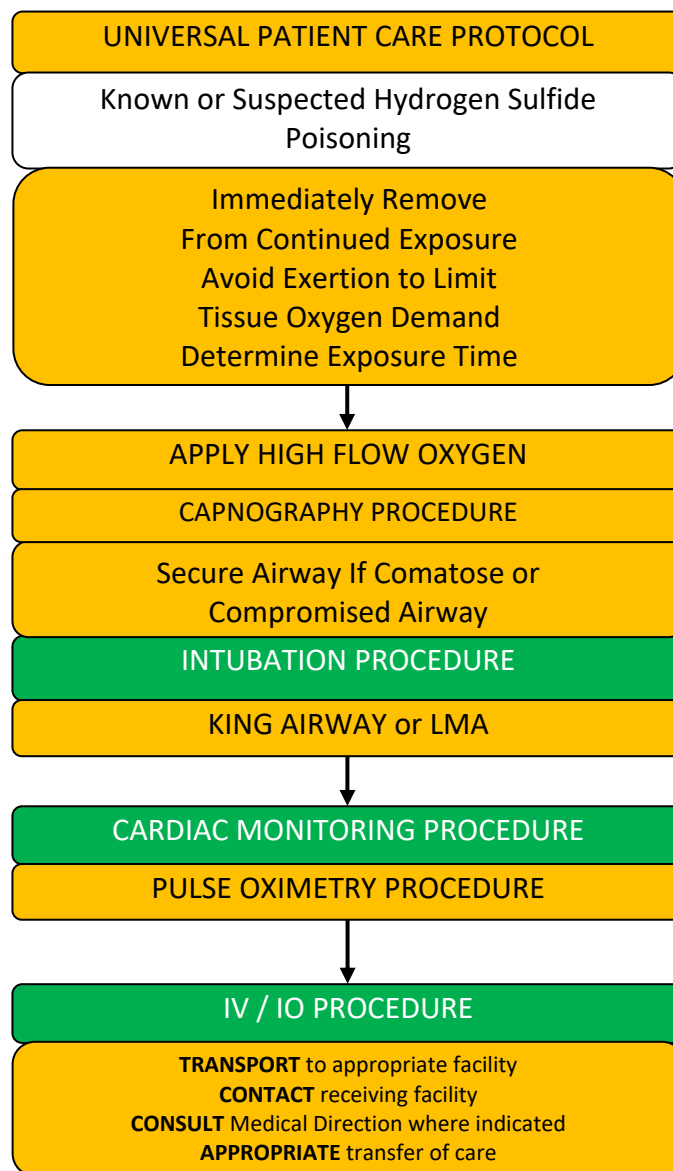
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**HYDROGEN SULFIDE EXPOSURE**

PATHOPHYSIOLOGY AND ROUTES	SIGNS AND SYMPTOMS	SOURCES AND USES
<p>Hydrogen sulfide gas interferes with the uptake of oxygen into cells halting cellular respiration and causing chemical asphyxiation</p> <p><b>Inhalation</b> <b>Skin and Eye Absorption</b></p>	<ul style="list-style-type: none"> <li>• Headache/Nausea/Vomiting</li> <li>• Tachypnea/Dyspnea</li> <li>• Pulmonary Edema</li> <li>• Irritates Skin and Eyes</li> <li>• Hypotension</li> <li>• Dizziness, weakness, restlessness</li> <li>• Altered LOC</li> <li>• Seizures</li> <li>• Coma</li> </ul>	<ul style="list-style-type: none"> <li>• Decomposition of organic material</li> <li>• Sewer gas</li> <li>• Acid and Sulfur reactions</li> <li>• Chemical suicide</li> <li>• Industrial gas</li> <li>• Pulp and Paper Mills</li> <li>• Natural Gas Production</li> </ul>



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**METHEMOGLOBIN FORMERS**

PATHOPHYSIOLOGY AND ROUTES	SIGNS AND SYMPTOMS	SOURCES AND USES
<p>These nitro compounds change hemoglobin into non-oxygen carrying methemoglobin.</p> <p><b>Inhalation</b> <b>Skin and Eye Absorption</b> <b>Ingestion</b></p>	<ul style="list-style-type: none"> <li>• Cyanosis</li> <li>• Headache</li> <li>• Nausea and vomiting</li> <li>• Tachycardia/Arrhythmias</li> <li>• Syncope</li> <li>• Dyspnea</li> <li>• Seizures</li> <li>• Coma / Death</li> <li>• There may be a detectable change in blood color from red to chocolate brown.</li> </ul>	<ul style="list-style-type: none"> <li>• Amines</li> <li>• Aniline dyes</li> <li>• Nitrites</li> <li>• Nitrates</li> <li>• Nitric Oxide</li> <li>• Nitrobenzene</li> <li>• Nitrogen Dioxide</li> <li>• Commonly found in fertilizers, paints, inks and dyes</li> </ul>

Potential exposure with signs/symptoms consistent with exposure

Remove patient from continued exposure

Assure proper decon has been performed prior to patient contact

Assure adequate airway, ventilation and oxygenation. Secure airway against secretions

OXYGEN 100% By Non-Rebreather

Confirm symptomatic and NO clinical suspicion of exposure to carbon monoxide and / or cyanide poisoning

IF HYPOTENSIVE – CORRECT HYPOTENSION BEFORE METHYLENE BLUE

Establish 2 large bore IV's in non-exposed areas if possible  
20 ml / kg Normal Saline if Hypotensive

Consider if non-responsive to fluid challenge  
DOPAMINE (INTROPIN) 5 – 20 mcg / kg /min or EPINEPHRINE DRIP 0.1 – 0.5 mcg / kg / min

Administer METHYLENE BLUE 1 - 2 mg / kg IV VERY slowly over 10 minutes  
followed by 30 ml Saline Flush to decrease pain at the IV site

TRANSPORT to appropriate facility CONTACT receiving facility NOTIFY of HAZ-MAT Situation  
CONSULT Medical Direction where indicated APPROPRIATE transfer of care

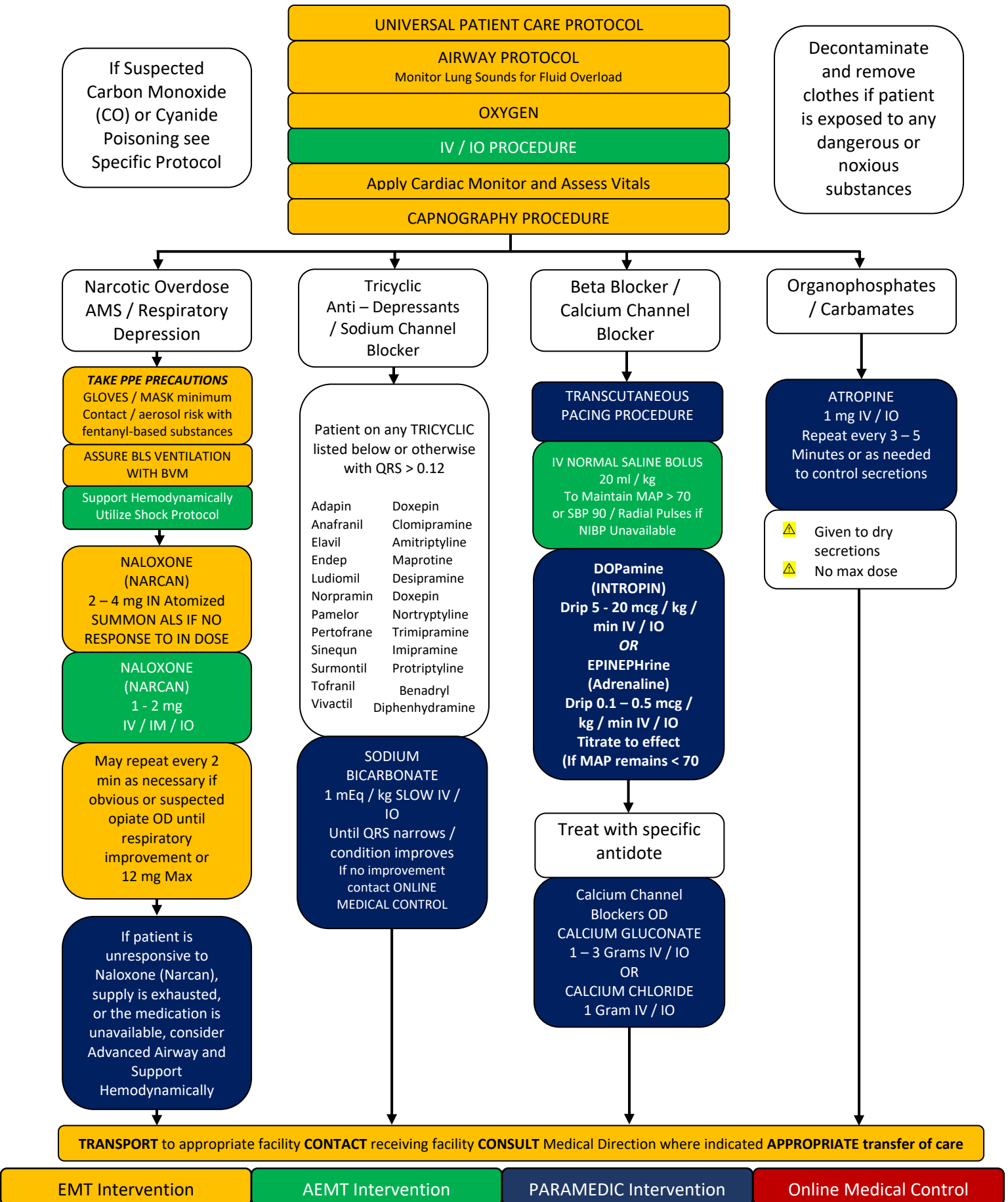
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**TOXIC INGESTION / EXPOSURE / OVERDOSE - ADULT**



# TOXIC INGESTION / EXPOSURE / OVERDOSE - ADULT

HISTORY	SIGNS AND SYMPTOMS	DIFFERENTIAL DIAGNOSIS
<ul style="list-style-type: none"> <li>Ingestion or suspected ingestion of a potentially toxic substance</li> <li>Substance ingested, route, quantity</li> <li>Time of ingestion</li> <li>Reason (suicidal, accidental, criminal)</li> <li>Available medications in home</li> <li>Past medical history, medications</li> </ul>	<ul style="list-style-type: none"> <li>Mental status changes</li> <li>Hypo / hypertension</li> <li>Decreased respiratory rate</li> <li>Tachycardia, dysrhythmias</li> <li>Seizures</li> </ul>	<ul style="list-style-type: none"> <li>Tricyclic antidepressants (TCAs)</li> <li>Acetaminophen (Tylenol)</li> <li>Depressants</li> <li>Stimulants</li> <li>Anticholinergic</li> <li>Cardiac medications</li> <li>Solvents, alcohols, Cleaning agents</li> <li>Insecticides (organophosphates)</li> <li>Respiratory depression</li> <li>Other organophosphates</li> <li>Carbamates</li> </ul>

COMMON BETA BLOCKERS			
Acebutolol	Carvedilol	Labetolol	Propranolol
Atenolol	Coreg	Levator	Sectral
Betapace	Corgard	Lopressor	Sotalol
Betoxolol	Esmolol	Metoprolol	Tenormin
Bisoprolol	Inderal	Nadolol	Timolol
Brevibloc	Innopran XL	Nebivolol	Trandate
Bystolic	Kerlone	Pindolol	Zabeta
COMMON CALCIUM CHANNEL BLOCKERS			
Acalas	Cardene	Lacidipine	Nitrepin
Adalat	Cardif	Lacipil	Nivadil
Amlodipine	Cardizem	Landel	Norvasc
Aranidipine	Cilnidipine	Lercanidipine	Plendil
Atelec	Cinalong	Madipine	Pranidipine
Azelnidipine	Clevidipine	Manidipine	Procardia
Barnidipine	Cleviprex	Motens	Procorum
Baylotensin	Coniel	Nicardipine	Sapresta
Baymycard	Diltiazem	Nifedipine	Siscard
Benidipine	Efonidipine	Nilvadipine	Sular
Calan	Felodipine	Nimodipine	Syscor
Calblock	Gallopamil	Nimotop	Verapamil
Calslot	HypoCa	Nisoldipine	Zanidip
Carden SR	Isoptin	Nitrendipine	

## KEY POINTS

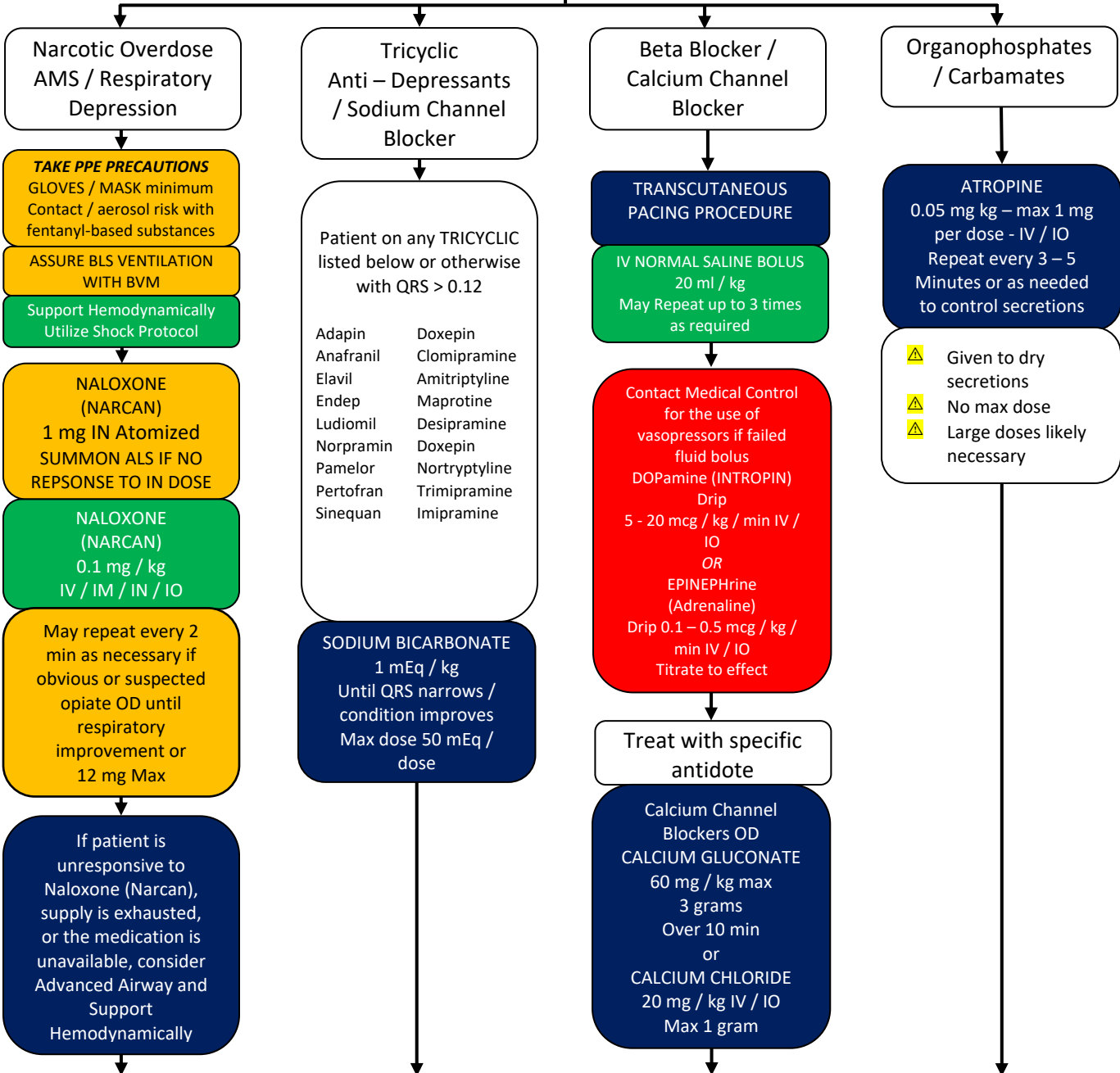
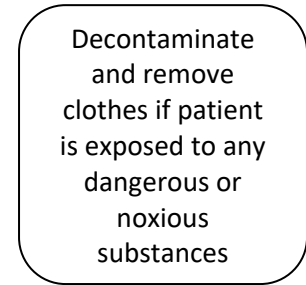
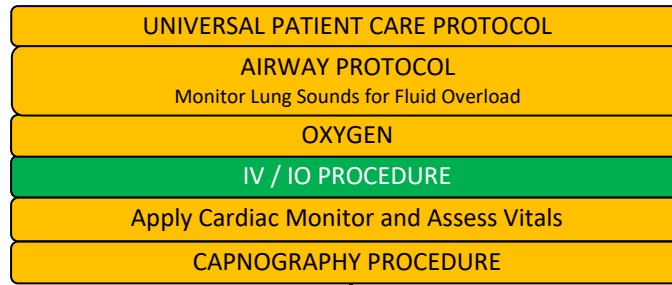
- Exam: Mental Status, Skin, HEENT, Heart, Lungs, Abdomen, Extremities, Neuro
- Do not rely on patient history of ingestion, especially in suicide attempts.
- Bring bottles, contents, and emesis to ED.
- Tricyclic:** 4 major areas of toxicity: seizures, dysrhythmias, hypotension, decreased mental status or coma; rapid progression from alert mental status to death.
- Acetaminophen:** initially normal or nausea / vomiting. If not detected and treated, causes irreversible liver failure.
- Depressants:** decreased HR, decreased BP, decreased temperature, decreased respirations, non-specific pupils.
- Stimulants:** increased HR, increased BP, increased temperature, dilated pupils, and seizures.
- Anticholinergics:** increased HR, increased temperature, dilated pupils, and mental status changes.
- Cardiac Medications:** dysrhythmias and mental status changes.
- Solvents:** nausea, vomiting, and mental status changes.
- Insecticides:** increased or decreased HR, increased secretions, nausea, vomiting, diarrhea, pinpoint pupils.
- Consider restraints if necessary for patient's and / or personnel's protection per the [Restraint Procedure](#).
- If it can be done safely, take whatever container the substance came from to the hospital along with readily obtainable samples of medication unless this results in an unreasonable delay of transport.
- If applicable, DO NOT transport a patient to the hospital until properly decontaminated.
- Naloxone (Narcan) administration may cause the patient to go into acute opiate withdrawal, which includes vomiting, agitation, and / or combative behavior. Always be prepared for combative behavior.
- Naloxone (Narcan) goal is to reverse life threatening respiratory depression
- Naloxone (Narcan) may wear off in as little as 20 minutes causing the patient to become more sedate and possibly hypoventilate. All A&O 4 patients having received Naloxone (Narcan) should be transported. If patient refuses transport, contact Online Medical Control before release.

CARBON MONOXIDE POISONING OR CYANIDE POISONING – SEE SPECIFIC PROTOCOL

# POISON CONTROL 1-800-222-1222

**TOXIC INGESTION / EXPOSURE / OVERDOSE - PEDI**

3-5 kg	6-7 kg	8-9 kg	10-11 kg	12-14 kg	15-18 kg	19-23 kg	24-29 kg	30-36 kg
6-11 lbs	13-15 lbs	18-20 lbs	22-24 lbs	26-31 lbs	33-37 lbs	42-51 lbs	53-64 lbs	66-81 lbs
18-24 in	24-26 in	26-29 in	29-33 in	33-38 in	38-43 in	43-48 in	48-52 in	52-57 in



**TRANSPORT** to appropriate facility **CONTACT** receiving facility **CONSULT** Medical Direction where indicated **APPROPRIATE** transfer of care



# TOXIC INGESTION / EXPOSURE / OVERDOSE - PEDS

HISTORY	SIGNS AND SYMPTOMS	DIFFERENTIAL DIAGNOSIS	
<ul style="list-style-type: none"> <li>Ingestion or suspected ingestion of a potentially toxic substance</li> <li>Substance ingested, route, quantity</li> <li>Time of ingestion</li> <li>Reason (suicidal, accidental, criminal)</li> <li>Available medications in home</li> <li>Past medical history, medications</li> </ul>	<ul style="list-style-type: none"> <li>Mental status changes</li> <li>Hypo / hypertension</li> <li>Decreased respiratory rate</li> <li>Tachycardia, dysrhythmias</li> <li>Seizures</li> </ul>	<ul style="list-style-type: none"> <li>Tricyclic antidepressants (TCAs)</li> <li>Acetaminophen (Tylenol)</li> <li>Depressants</li> <li>Stimulants</li> <li>Anticholinergic</li> <li>Cardiac medications</li> <li>Solvents, alcohols, Cleaning agents</li> <li>Insecticides (organophosphates)</li> <li>Respiratory depression</li> <li>Carbamates</li> </ul>	
<b>COMMON BETA BLOCKERS</b>			
Acebutolol	Carvedilol	Labetolol	Propranolol
Atenolol	Coreg	Levatol	Sectral
Betapace	Corgard	Lopressor	Sotalol
Betoxolol	Esmolol	Metoprolol	Tenormin
Bisoprolol	Inderal	Nadolol	Timolol
Brevibloc	Innopran XL	Nebivolol	Trandate
Bystolic	Kerlone	Pindolol	Zebeta
<b>COMMON CALCIUM CHANNEL BLOCKERS</b>			
	Cardene	Lacidipine	Nitrepin
Adalat	Cardifen	Lacipil	Nivadil
Amlodipine	Cardizem	Landel	Norvasc
Aranidipine	Cilnidipine	Lercanidipine	Plendil
Atelec	Cinalong	Madipine	Pranidipine
Azelnidipine	Clevidipine	Manidipine	Procardia
Barnidipine	Cleviprex	Motens	Procorum
Baylotensin	Coniel	Nicardipine	Sapresta
Baymycard	Diltiazem	Nifedipine	
Benidipine	Efonidipine	Nilvadipine	Sular
Calan	Felodipine	Nimodipine	Syscor
Calblock	Gallopamil	Nimotop	Verapamil
Calslot	HypoCa	Nisoldipine	Zanidip
Carden SR	Isoptin	Nitrendipine	

## POISON CONTROL 1-800-222-1222

### KEY POINTS

- Exam: Mental Status, Skin, HEENT, Heart, Lungs, Abdomen, Extremities, Neuro**
- Do not rely on patient history of ingestion, especially in suicide attempts.
- Bring bottles, contents, and emesis to ED.
- Tricyclic:** 4 major areas of toxicity: seizures, dysrhythmias, hypotension, decreased mental status or coma; rapid progression from alert mental status to death.
- Acetaminophen:** initially normal or nausea / vomiting. If not detected and treated, causes irreversible liver failure.
- Depressants:** decreased HR, decreased BP, decreased temperature, decreased respirations, non-specific pupils.
- Stimulants:** increased HR, increased BP, increased temperature, dilated pupils, and seizures.
- Anticholinergics:** increased HR, increased temperature, dilated pupils, and mental status changes.
- Cardiac Medications:** dysrhythmias and mental status changes.
- Solvents:** nausea, vomiting, and mental status changes.
- Insecticides:** increased or decreased HR, increased secretions, nausea, vomiting, diarrhea, pinpoint pupils.
- Consider restraints if necessary for patient's and / or personnel's protection per the [Restraint Procedure](#).
- If it can be done safely, take whatever container the substance came from to the hospital along with readily obtainable samples of medication unless this results in an unreasonable delay of transport.
- If applicable, DO NOT transport a patient to the hospital until properly decontaminated.
- Medical Direction may order antidotes for specific ingestions.
- DO NOT** use syrup of ipecac.
- Be aware of AMS as potential sign of an environmental toxin or Haz-Mat exposure and protect personal safety.
- It is safer to assume hypoglycemia than hyperglycemia if doubt exists.
- Do not let alcohol confuse the clinical picture. Alcoholics frequently develop hypoglycemia and need Thiamine before glucose.
- Low glucose (< 60), normal glucose (60 - 120), high glucose (> 250).
- Protect the patient airway and support ABCs.
- Document the patient's Glasgow coma score pre and post treatment.
- Signs and symptoms of narcotic overdose include respiratory depression and altered mental status.
- Naloxone (Narcan) administration may cause the patient to go into acute opiate withdrawal, which includes vomiting, agitation, and / or combative behavior. Always be prepared for combative behavior.
- Naloxone (Narcan) may wear off in as little as 20 minutes causing the patient to become more sedate and possibly hypoventilate. All A&O 4 patients having received Naloxone (Narcan) should be transported. If patient refuses transport, contact Online Medical Control before release.

## Section 3 Haz-Mat Medications

Amyl Nitrite .....	23-1
Benzalkonium Chloride .....	24-1
Calcium Chloride .....	25-1
Calcium Gluconate .....	26-1
Calcium Gluconate .....	27-1
Calcium Gluconate .....	28-1
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DuoDote (Atropine and Pralidoxime) and Valium NERVE AGENT KIT .....	30-1
Methylene Blue .....	31-1
Sodium Nitrite .....	32-1
Sodium Theosulfate.....	33-1

**Amyl Nitrite****NOT FOR USE WITH SMOKE INHALATION**

<b>PREGNANCY CLASS</b>	C
<b>ACTIONS</b>	When used in cyanide poisoning the nitrite ions react with hemoglobin to form methemoglobin which unites with cyanide to form cyanomethemoglobin. This causes cytochrome oxidase to become free, which in turn allows aerobic metabolism to continue.
<b>INDICATIONS</b>	Symptoms from exposure to cyanides, sulfides and nitriles
<b>CONTRAINDICATIONS</b>	<ol style="list-style-type: none"> <li>1. NOT FOR USE WITH SMOKE INHALATION</li> <li>2. Documented hypersensitivity</li> <li>3. Recent head trauma</li> </ol>
<b>PRECAUTIONS</b>	
<b>SIDE EFFECTS</b>	<ol style="list-style-type: none"> <li>1. Dizziness</li> <li>2. Flushing</li> <li>3. Hypotension</li> <li>4. Tachycardia</li> <li>5. Vasodilation</li> <li>6. Headache/Restlessness</li> <li>7. Syncope</li> <li>8. Shock</li> <li>9. Nausea/Vomiting</li> </ol>
<b>SUPPLIED</b>	0.3 ml crushable glass ampule
<b>ADULT DOSAGE</b>	Inhale for 30 seconds every minute followed by 30 seconds of 100% oxygen until IV access is established for administration of Sodium Nitrite. Use a new perle every 3 minutes.
<b>PEDIATRIC DOSAGE</b>	
<b>KEY POINTS</b>	

**BENZALKONIUM CHLORIDE (ZEPHIRAN CHLORIDE®)**

<b>PREGNANCY CLASS</b>	N
<b>ACTIONS</b>	Quaternary Ammonium Compound which relieves pain and slows the passage of the fluoride ion into deeper tissues and into the bloodstream
<b>INDICATIONS</b>	Immerse burns from Hydrogen Fluoride or Hydrofluoric Acid in in an iced, aqueous solution 0.13% benzalkonium chloride (e.g. Zephiran). If immersion is not possible, then apply towels soaked in the same solution and re-soak every 2-4 minutes
<b>CONTRAINDICATIONS</b>	1. Documented Hypersensitivity
<b>PRECAUTIONS</b>	1. For external use only. Topical use only, not for internal use. 2. Avoid contact with eyes 3. Ice should be cubed rather than crushed to avoid hypothermia
<b>SIDE EFFECTS</b>	1. Swelling, redness, skin irritation. 2. Itching and hives 3. Wheezing and chest tightness
<b>SUPPLIED</b>	0.13% solution, chilled with ice if available
<b>ADULT DOSAGE</b>	
<b>PEDIATRIC DOSAGE</b>	
<b>KEY POINTS</b>	

**Calcium Chloride (10%)**

<b>PREGNANCY CLASS</b>	C
<b>ACTIONS</b>	Used in emergency response to exposure of hydrofluoric acid (HF). Calcium chloride combines with hydrofluoric acid to neutralize the powerful fluoride ion and relieve pain.
<b>INDICATIONS</b>	Exposure to Hydrofluoric Acid
<b>CONTRAINDICATIONS</b>	<ol style="list-style-type: none"> <li>1. Documented Hypersensitivity</li> <li>2. Hypercalemia</li> </ol>
<b>PRECAUTIONS</b>	<ol style="list-style-type: none"> <li>1. Calcium Chloride must be administered in a dedicated IV line</li> <li>2. Rapid administration may cause bradycardia and/or cardiac arrest</li> <li>3. Local infiltration will cause significant tissue necrosis at the injection site</li> </ol>
<b>SIDE EFFECTS</b>	<ol style="list-style-type: none"> <li>1. Peripheral vasodilation</li> <li>2. Drowsiness</li> <li>3. Tingling sensation</li> <li>4. Calcium taste</li> <li>5. Sweating</li> <li>6. Muscle weakness</li> <li>7. Nausea, vomiting, ABD pain</li> </ol>
<b>SUPPLIED</b>	10% solution . 10 ml vial, 100 mg/ml (1 gm/10 ml)
<b>ADULT DOSAGE</b>	0.1 to 0.2 mL/kg SLOW IV (repeat doses may be required)
<b>PEDIATRIC DOSAGE</b>	0.1 to 0.2 mL/kg SLOW IV (repeat doses may be required)
<b>KEY POINTS</b>	

## Calcium Gluconate Eye Irrigation Solution (1%)

<b>PREGNANCY CLASS</b>	C
<b>ACTIONS</b>	Used in emergency response to hydrofluoric acid (HF) exposure or contact to the eyes. Calcium gluconate combines with hydrofluoric acid to neutralize the powerful fluoride ion and relieve pain.
<b>INDICATIONS</b>	Hydrofluoric Acid exposure to the eyes
<b>CONTRAINDICATIONS</b>	1. Documented Hypersensitivity
<b>PRECAUTIONS</b>	1. For eye irrigation only. 2. Not for intravenous injection.
<b>SIDE EFFECTS</b>	1. Swelling, redness, irritation.
<b>SUPPLIED</b>	1% solution (premixed 50 cc of 10% solution in 500 ml of Normal Saline)
<b>ADULT DOSAGE</b>	
<b>PEDIATRIC DOSAGE</b>	
<b>KEY POINTS</b>	

**Calcium Gluconate Gel (2.5%)**

<b>PREGNANCY CLASS</b>	C
<b>ACTIONS</b>	Used in emergency response to hydrofluoric acid (HF) exposure or contact to the body. Calcium gluconate combines with hydrofluoric acid to neutralize the powerful fluoride ion and relieve pain.
<b>INDICATIONS</b>	Calcium gluconate gel is indicated as an integral part in responding to Hydrofluoric Acid exposure to the body, mitigating or preventing the related pain and potential tissue burns and bone damage.
<b>CONTRAINDICATIONS</b>	1. Hypersensitivity
<b>PRECAUTIONS</b>	1. For external use only. Topical use only, not for internal use. 2. Avoid contact with eyes
<b>SIDE EFFECTS</b>	1. Swelling, redness, skin irritation.
<b>SUPPLIED</b>	30 cc tube of 2.5% Calcium Gluconate in water soluble jelly
<b>ADULT DOSAGE</b>	Topical application
<b>PEDIATRIC DOSAGE</b>	Topical application
<b>KEY POINTS</b>	<ul style="list-style-type: none"> <li>• Store between 15-30°C (59-86°F).</li> <li>• Use directly from tube, one tube per application, then safely discard.</li> <li>• Ensure adequate ventilation at all times.</li> </ul>

## Calcium Gluconate Solution (10%)

<b>PREGNANCY CLASS</b>	C
<b>ACTIONS</b>	Used in emergency response to exposure of hydrofluoric acid (HF). Calcium gluconate combines with hydrofluoric acid to neutralize the powerful fluoride ion and relieve pain.
<b>INDICATIONS</b>	Exposure to Hydrofluoric Acid
<b>CONTRAINDICATIONS</b>	1. Hypersensitivity
<b>PRECAUTIONS</b>	
<b>SIDE EFFECTS</b>	
<b>SUPPLIED</b>	10% solution 10 ml vial, 100 mg/ml (1 gm/10 ml)
<b>ADULT DOSAGE</b>	0.2 to 0.3 mL/kg SLOW IV (repeat doses may be required)
<b>PEDIATRIC DOSAGE</b>	0.2 to 0.3 mL/kg SLOW IV (repeat doses may be required)
<b>KEY POINTS</b>	

**Calcium Gluconate Solution for Nebulizer (2.5%)**

<b>PREGNANCY CLASS</b>	C
<b>ACTIONS</b>	Used in emergency response to inhalation exposure of hydrofluoric acid (HF). Calcium gluconate combines with hydrofluoric acid to neutralize the powerful fluoride ion and relieve pain.
<b>INDICATIONS</b>	Inhalation exposure to Hydrofluoric Acid vapors
<b>CONTRAINDICATIONS</b>	1. Hypersensitivity
<b>PRECAUTIONS</b>	1. For nebulization only. 2. Not for intravenous injection.
<b>SIDE EFFECTS</b>	
<b>SUPPLIED</b>	2.5% solution in Normal Saline
<b>ADULT DOSAGE</b>	
<b>PEDIATRIC DOSAGE</b>	
<b>KEY POINTS</b>	

## Duo-Dote (Atropine and Pralidoxime Chloride) VALIUM Auto Injector

<b>PREGNANCY CLASS</b>	C
<b>ACTIONS</b>	<p><b>DuoDote</b></p> <ul style="list-style-type: none"> <li>Blocks nerve agents effects and relieves airway constriction and secretions in the lungs and gastrointestinal tract.</li> <li>Acts to restore normal functions at the nerve ending by removing the nerve agent and reactivating natural function</li> </ul> <p><b>Valium:</b></p> <ul style="list-style-type: none"> <li>Given to treat seizures caused by exposure to nerve agents (buddy treatment) – SUPPLEMENT TO DUODOTE</li> </ul>
<b>INDICATIONS</b>	Suspected or confirmed nerve agent exposure
<b>CONTRAINDICATIONS</b>	Both medications in the kit should be used with caution (but not withheld) in patients with preexisting cardiac disease, HTN, or CVA history
<b>PRECAUTIONS</b>	
<b>SIDE EFFECTS</b>	<ol style="list-style-type: none"> <li>Chest pain</li> <li>Exacerbation of angina</li> <li>Myocardial infarction</li> <li>Blurred vision</li> <li>Headache</li> <li>Drowsiness</li> <li>Nausea</li> <li>Tachycardia</li> <li>Hypertension</li> <li>Hyperventilation</li> </ol>
<b>SUPPLIED</b>	DUODOTE - Each auto injector contains <b>BOTH</b> : Atropine 2.1 mg and Pralidoxime 600 mg Valium auto injector contains 10 mg
<b>ADULT DOSAGE</b>	<p><b>For Nerve Agent Exposure (SLUDGE symptoms):</b> Up to 3 auto injectors may be used for one patient based on signs (1 - 2 kits for self-treatment - up to 3 for buddy treatment with severe symptoms)</p> <p><b>For Seizures Associated with Nerve Agent Exposure:</b> 1 Valium auto injector (buddy administration)</p>
<b>PEDIATRIC DOSAGE</b>	DuoDotes are not authorized for the use of children under 41 kg (

**Methylene Blue**

<b>PREGNANCY CLASS</b>	X
<b>ACTIONS</b>	Methylene blue is a water-soluble thiazine dye that promotes a nonenzymatic redox conversion of metHb to hemoglobin
<b>INDICATIONS</b>	Methemoglobinemia
<b>CONTRAINDICATIONS</b>	1. Severe hypersensitivity reactions to methylene blue or any other thiazine dye
<b>PRECAUTIONS</b>	<ol style="list-style-type: none"> <li>1. Mix with D5W. Do not mix with 0.9% NaCl, because it has been demonstrated that chloride reduces the solubility of methylene blue.</li> <li>2. The presence of methylene blue in the blood may result in an underestimation of the oxygen saturation reading by pulse oximetry</li> <li>3. May cause confusion, dizziness and disturbances in vision</li> <li>4. For IV use only, do not administer SC or IM. Administer IV slowly over 5-30 minutes.</li> </ol>
<b>SIDE EFFECTS</b>	<ol style="list-style-type: none"> <li>1. Chromaturia</li> <li>2. Dizziness</li> <li>3. Nausea</li> </ol>
<b>SUPPLIED</b>	5mg/mL (50mg/10mL) single-dose ampule
<b>ADULT DOSAGE</b>	1-2 mg/kg slow IV bolus over 5 minutes (repeat dose may be required)
<b>PEDIATRIC DOSAGE</b>	1-2 mg/kg slow IV bolus over 5 minutes (repeat dose may be required)
<b>KEY POINTS</b>	<ul style="list-style-type: none"> <li>• Store at 20-25°C (68-77°F)</li> <li>• Do not refrigerate or freeze</li> <li>• Keep ampule in original container to protect from light</li> </ul>

**Sodium Nitrite****NOT FOR USE WITH SMOKE INHALATION**

<b>PREGNANCY CLASS</b>	C
<b>ACTIONS</b>	Nitrites create methemoglobinemia to bind to cyanide and forms non-toxic cyanomethemoglobin
<b>INDICATIONS</b>	Symptoms from exposure to cyanides, sulfides and nitriles
<b>CONTRAINDICATIONS</b>	<ol style="list-style-type: none"> <li>1. NOT FOR USE WITH SMOKE INHALATION</li> <li>2. Documented hypersensitivity</li> </ol>
<b>PRECAUTIONS</b>	<ol style="list-style-type: none"> <li>1. Monitor blood pressure during sodium nitrite administration, and slow the rate of infusion if hypotension develops</li> <li>2. Pulse oximetry may be unreliable in the presence of methemoglobin</li> </ol>
<b>SIDE EFFECTS</b>	<ol style="list-style-type: none"> <li>1. Hypotension</li> <li>2. Severe methemoglobinemia</li> <li>3. Worsening hypoxia</li> <li>4. Tachycardia</li> <li>5. Headache</li> </ol>
<b>SUPPLIED</b>	10 mL of a 3% solution (300 mg)
<b>ADULT DOSAGE</b>	10 ml (1 amp) SLOW IV bolus over 5 minutes
<b>PEDIATRIC DOSAGE</b>	0.12 to 0.33 ml /kg SLOW IV bolus over 5 minutes (not to exceed 10 ml)
<b>KEY POINTS</b>	

## Sodium Thiosulfate

<b>PREGNANCY CLASS</b>	C
<b>ACTIONS</b>	In cyanide poisoning, converts cyanide to thiocyanate which is relatively non-toxic and is readily excreted in the urine
<b>INDICATIONS</b>	Symptoms from exposure to cyanides, sulfides and nitriles
<b>CONTRAINDICATIONS</b>	1. Documented hypersensitivity
<b>PRECAUTIONS</b>	
<b>SIDE EFFECTS</b>	<ol style="list-style-type: none"> <li>1. Hypotension</li> <li>2. Nausea/vomiting</li> <li>3. Disorientation</li> <li>4. Headache</li> <li>5. Local irritation</li> </ol>
<b>SUPPLIED</b>	50 mL of a 25% solution (12.5 g)
<b>ADULT DOSAGE</b>	50 ml (1 amp) SLOW IV bolus over 10-20 minutes
<b>PEDIATRIC DOSAGE</b>	1.6 ml/kg SLOW IV bolus over 10-20 minutes up to a maximum of 50 ml
<b>KEY POINTS</b>	

# Section 4 Haz-Mat Procedures

Duo-Dote Administration Procedure .....35-1  
Morgan Lens Irrigation Procedure .....37-1

# NERVE AGENT EXPOSURE KIT

ENSURE SCENE SAFETY AND PROPER PPE

UNIVERSAL PATIENT CARE PROTOCOL

Obtain history of exposure  
Observe for specific toxidromes  
Initiate triage and / or decontamination as indicated

Assess for presence of major or minor symptoms

**MINOR SYMPTOMS**  
(Self Treatment)  
Salivation  
Lacrimation  
Visual Disturbances

DuoDote x 1 – 2 sets  
IM Rapidly

Monitor for appearance of major symptoms

***SLUDGEM***  
SALVIATION  
LACRIMATION  
URINATION  
DEFICATION  
GASTROINTESTINAL DISTRESS  
EMESIS  
MUSCLE TWITCHING

**MAJOR SYMPTOMS**  
(Buddy Treatment)  
Altered LOC  
Seizures  
SOB  
Respiratory Arrest

DuoDote x 3 sets  
IM Rapidly

If Seizures:  
DIAZEPAM (VALIUM)  
Auto-Injector IM

If Continued Seizures:  
LORAZEPAM (ATIVAN)  
1 - 2 mg IV / IO / IN / IM  
Or  
MIDAZOLAM (VERSED)  
2 mg IV / IO or 5 mg IN / IM

If Continued SLUDGEM Symptoms:  
ATROPINE  
2 mg IV / IM  
q 5 minutes until symptoms resolved

**TRANSPORT** to appropriate facility  
**CONTACT** receiving facility  
**CONTACT** Medical Direction where indicated

## NERVE AGENT EXPOSURE KIT

INDICATIONS	SIGNS AND SYMPTOMS	CONTRAINDICATIONS
<ul style="list-style-type: none"> <li>• Nerve agent exposure (e.g., VX, Sarin, Soman, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>• Visual disturbances</li> <li>• Headache</li> <li>• Nausea / vomiting</li> <li>• Salivation</li> <li>• Lacrimation</li> <li>• Respiratory distress</li> <li>• Diaphoresis</li> <li>• Seizure activity</li> <li>• Respiratory arrest</li> </ul>	<ul style="list-style-type: none"> <li>• Vesicant exposure (e.g., Mustard Gas, etc.)</li> <li>• Respiratory irritant exposure (e.g., hydrogen sulfide, ammonia, chlorine, etc.)</li> </ul>

### KEY POINTS

- If Triage / MCI issues exhaust supply of Mark 1 kits or DuoDotes, use Atropine. Give 2 mg IM dose for patients greater than 90 pounds (>40kg).
- Follow local HAZMAT protocols for decontamination and use of personal protective equipment.
- For patients with major symptoms, there is no limit for atropine dosing.
- Carefully evaluate patients to ensure they not from exposure to another agent. (e.g., narcotics, vesicants, etc.)
- Each DuoDote auto injector contains both 600 mg of pralidoxime (2-PAM) and 2.1 mg of atropine
- Each valium auto injector contains 10 mg of valium
- If the presence of a nerve agent is suspected by presentation of symptoms of large numbers of patients, personnel should immediately contact dispatch to notify other responding units and command staff.
- The patient and / or crew must be decontaminated prior to transport. DO NOT transport a contaminated patient to a treatment facility.
- SLUDGEM: Salivation, Lacrimation, Urination, Gastrointestinal upset, Emesis, Muscle twitching.
- When the nerve agent has been ingested, exposure may continue for some time due to slow absorption from the lower bowel, and fatal relapses have been reported after initial improvement.
- If dermal exposure has occurred, decontamination is critical and should be done with standard decontamination procedures. Patient monitoring should be directed to the same signs and symptoms as with all nerve or organophosphate exposures.
- Continued medical monitoring and transport is mandatory.

# MORGAN LENS

## Morgan Lens Instructional Chart

Instructions for using the Morgan Lens for continuous medication or lavage to the cornea and conjunctiva.

**1**  
**INSERTION**  
Instill topical ocular anesthetic, if available.

**2**  
Attach a Morgan Lens Delivery Set (or a syringe or an I.V. set-up).

**3**  
Using solution and rate of choice\*; **START FLOW.** This allows Lens to "float" over cornea and sclera.

**4**  
Have patient look down, insert Morgan Lens under upper lid. Have patient look up, retract lower lid, drop Lens in place.

**5**  
Release the lower lid over Morgan Lens; adjust flow. Tape tubing to patient's forehead to prevent accidental Lens removal. Absorb outflow with the Medi-Duct (for best results, tape to head as shown). **DO NOT RUN DRY.**

**6**  
**REMOVAL**  
**CONTINUE FLOW.** Have patient look up, retract lower lid—hold position. Slide Morgan Lens out. **TERMINATE FLOW.**

## Morgan Lens Uses

	Solution	Mode with Morgan Lens	Rate	Frequency
Ocular injury due to acid burns or solvents, gasoline, detergents, etc.	Lactated Ringer's* Solution	Morgan Lens Delivery Set or I.V. set-up	500 ml rapid/free flow. Reassess and continue at slower rate.	Once. Repeat as necessary.
Alkali burns	Lactated Ringer's* Solution	Morgan Lens Delivery Set or I.V. set-up	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	Lactated Ringer's* Solution	Morgan Lens Delivery Set or I.V. set-up	500 ml rapid/free flow. Reassess and continue at slower rate.	Once. Repeat as necessary.
Foreign body sensation with no visible foreign body	20 cc sterile solution	20 cc syringe	Slowly without force.	Once. Repeat once if necessary.
Routine pre-operative	10 cc of preferred ocular antiseptic	10 cc syringe	Slowly without force.	Once.
Eyelid surgery (protecting the cornea during eyelid surgery)	Lactated Ringer's* Solution	Morgan Lens Delivery Set or I.V. set-up	4 drops/minute.	During entire procedure.
Severe infection	Lactated Ringer's* Solution with suitable antibiotic and steroid**	Morgan Lens Delivery Set or I.V. set-up	50 ml/hour or 15 drops/minute.	Continuous for 70 hours, then 10-hour intervals until marked improvement.

\*MorTan recommends lactated Ringer's because the pH level of 6.0 to 7.5 is much closer to tears (approximately 7.1) than Normal Saline (4.5 to 7.0). In addition, the lactate ion in lactated Ringer's exhibits a buffering capacity, returning the pH of either an acid or a base to neutral much more rapidly than a solution (such as saline) without any buffering capacity.

\*\*Use only when indicated.

