PATIENT TREATMENT STEPS

PLEASE LOOK TO THE APPROPRIATE SECTION FOR DETAILED INSTRUCTIONS.

1. DECONTAMINATE AND COLLECT INFORMATION

2. TREAT THE PATIENT FOR CHEMICAL EXPOSURES

3. COLLECT BLOOD AND URINE SPECIMENS

Collect specimens per your institution’s normal protocols for medical management. For unusual exposures, please contact MDH with questions about specimen collection.

This document is a reference and is not intended to replace medical advice. Specific exposures may require individual recommendations and should be managed with the help of the Poison Control Center. Healthcare workers should avoid becoming contaminated and use appropriate personal protective equipment per their institutional plans.

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SUPPORTIVE TREATMENTS

THE FOLLOWING SIX SUPPORTIVE TREATMENT STEPS ARE CRITICAL TO ALL TOXIC EXPOSURES.

1. AIRWAY BREATHING
   PROVIDE OXYGEN
   • Assess for respiratory distress (includes stridor, cough, or wheezing)
   • Treat with bronchodilators as needed
   • Control airway (e.g., intubate) as needed for respiratory failure, anticipated progression of symptoms, or coma

2. CIRCULATION
   SUPPORT BLOOD PRESSURE WITH IV NORMAL SALINE
   • Medications are rarely needed to maintain blood pressure after toxic exposures. Consult with Poison Control and consider central venous monitoring for persistent hypotension.

3. SEIZURES
   CONTROL SEIZURES WITH BENZODIAZEPINES

4. POISON CONSULT
   CONSULT WITH POISON CONTROL FOR ALL EXPOSURES 1-800-222-1222

5. ORGANS
   CONSIDER POTENTIAL FOR END-ORGAN DAMAGE BASED UPON AGENT
   • Cardiac
   • Pulmonary
   • Hepatic
   • Renal
   • CNS
   • Hematologic
   • Dermatologic

6. DISEASE
   CONSIDER CONTRIBUTION OF UNDERLYING DISEASE TO SYMPTOMS OR POTENTIAL FOR COMPLICATIONS
   • Cardiac (e.g., ischemia)
   • Pulmonary (e.g., asthma)
   • Renal
   • Hepatic
   • Hematologic (e.g., underlying anemia/hemoglobinopathy)
DECONTAMINATION BASIC STEPS

1. Cut or otherwise remove contaminated clothing. Usually this will remove 90% or contaminant.

2. Seal clothing in a bag.

3. Use soap and water to wash the affected area(s). Contain wastewater if possible.

Victims exposed to cholinergic/nerve agent vapor should receive decontamination.
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<td>Airway irritation • Stridor • Airway swelling • Eye irritation • Immediate/delayed pulmonary edema • Coughing, wheezing</td>
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**ASPHYXIANTS CHEMICAL**

**EXAMPLES:** CYANIDE | HYDROGEN SULFIDE | CARBON MONOXIDE | METHYLENE CHLORIDE

**TOXICITY**
Chemically interferes with use of oxygen by body tissues.

Closed space exposures

**SIGNS AND SYMPTOMS**
- Anxiety, tachycardia, eventual syncope, coma, and death if not removed from exposure environment.
- Peripheral or central cyanosis or 'chocolate brown' blood may indicate methemoglobinemia.
  Consult Poison Control.
- Tachypnea
- Cyanide – severe acidosis.
- Methylene chloride produces carbon monoxide in body.

**TREATMENT**

**Cyanide:** Remove from environment. Provide airway support and oxygen. Antidotal treatment for confirmed CN exposures or for confined space smoke exposure with acidosis and/or hemodynamic instability/dysrhythmia: Hydroxycobalmin (Cyanokit®) – 70 mg/kg to max 5 grams IV (expect reddened skin and possible hypertension) Sodium nitrite – if hydroxycobalmin unavailable –1 amp IV over 5-10 minutes (peds 0.2 ml/kg). May repeat x1 at 30 minutes if still unstable. Induces methemoglobinemia, thus expect oxygen situations in 85% range (consider transfer to hospital with hyperbaric oxygen capability). May also be used for symptomatic hydrogen sulfide (HS) exposures. Sodium thiosulfate – given for cyanide poisoning in addition to either of above treatments 1 amp IV over 5 minutes (peds 1.6 mg/kg of 25% preparation)

**Carbon Monoxide:** Consider hyperbaric oxygen for significant exposure (loss of consciousness, cardiac complications, pregnancy, other severe symptoms or prolonged (>5h exposure). Consult HCMC: 612-873-3132

**Methemoglobinemia:** Treatment is methylene blue. Starting dose 1-2mg/kg. Complication may be hemolysis. Contact Poison Control for treatment considerations.
# Asphyxiants

**Simple Examples:**
- Nitrogen
- Carbon Dioxide
- Methane
- Natural Gas

## Toxicity
Asphyxiants displace oxygen in an enclosed atmosphere causing hypoxemia.

Toxicity worse in closed spaces (or below grade spaces for gases denser than air).

Compressed liquid gases (e.g., nitrogen and propane) may cause frostbite to skin if in close proximity to source of leaking gas.

## Signs and Symptoms
- Anxiety
- Tachypnea and tachycardia due to hypoxia
- Eventual collapse, coma and death if not removed from exposure environment.

## Treatment
- Remove victim from exposure environment
- Administer oxygen
- Condition should not deteriorate after removal from exposure environment unless due to underlying disease complications (e.g., cardiac disease)
CHOLINERGICS

EXAMPLES: NERVE AGENTS
ORGANOPHOSPHATES: DIAZINON | MALATHION
CARBAMATES: SEVIN

TOXICITY
Allows uncontrolled persistent nerve simulation by poisoning acetylcholinesterase

SIGNS AND SYMPTOMS
“D U M B E L S”
- Diarrhea
- Urination
- Miosis - Small pupils (critical finding!)
- Bradycardia, Bronchorrhea, Bronchospasm
- Emesis
- Lacrimation
- Salivation
- Secretion
- Sweating

TREATMENT
DECONTAMINATION: Soap and water wash the patient. Bag and seal clothing to prevent off-gassing. Body fluids may contain high levels of agent in ingestion cases. (Poses threat to rescuers from contact/vapor.)

INTUBATION, ANTIDOTAL THERAPY:
- **Atropine** 3-5mg per dose IM/IV (0.1mg/kg) repeat as needed to control secretions and allow ventilation.
- **Pralidoxime** 1-2g IV or 25mg/kg (not required for carbamate exposure) over 10 min, repeat at 30 min if still critically ill or exhibiting fasciculations, seizures, or weakness.
- **Duodote or Mark 1 kit autoinjectors** (2PAM 600 mg/atropine 2 mg) 2 kits/sever poisoning, 1 kit for <10 years old or mild poisoning. (High potential for healthcare worker contamination and toxicity – decontaminate patient and wear personal protective equipment as required.)
- **Benzodiazepines** should be given to all severely poisoned patients and for seizures.

Consult Poison Control regarding decontamination and further therapy.
**CORROSIVES**

**EXAMPLES:**
- ACIDS: HYDROCHLORIC ACID | NITRIC ACID | SULFURIC ACID | HYDROFLUORIC (HF) ACID
- BASES: SODIUM HYDROXIDE | POTASSIUM HYDROXIDE
- OXIDIZERS: WHITE PHOSPHORUS

**TOXICITY**

Damage to tissues

Alkalies penetrate tissues deeply, acids affect surface tissues (except HF, which can cause deceptively severe burns and hypocalcemia)

Oxidizers cause thermal burns in addition to chemical burns

White phosphorus can cause hemolysis, methemoglobinemia, and hypocalcemia

**SIGNS AND SYMPTOMS**

- Pain may be minimal early after exposure, especially to alkalies
- White phosphorous – anemia from hemolysis, ‘chocolate’ colored blood from methemoglobinemia
- HF - profound pain at exposure site, weakness, muscle twitching/tetany Electrocardiogram changes (long QT, AV block) or dysrhythmia from low calcium
- Eye burns - pain, tearing, vision changes
- Ingestions may have severe esophageal burns with normal oral exam

**TREATMENT**

Irrigate copiously with water. If a chemical alkali is involved, irrigate continuously until the surface pH remains neutral 5 min after last irrigation. For eye irrigation, use topical anesthetic; consider Morgan lens. May require admission for ongoing irrigation. Consult ophthalmology for eye injuries. Oxidizers: consult Poison Control.

HF – Calcium replacement (large doses of Ca may be needed), also Mg and K. Topical and IV calcium, may need intra-arterial calcium treatment. Consult Poison Control immediately.

White phosphorus – Calcium replacement and further treatment per Poison Control. Assess for hemolysis, methemoglobinemia and treat as indicated.

Decontaminate, then treat tissue injury as you would treat thermal burns. Assure re-evaluation in 24 hours (or sooner if any worsening or new symptoms/signs).

Consult Poison Control and consider GI consult for ingestions.
HYDROCARBONS
HALOGENATED HYDROCARBONS

EXAMPLES: GASOLINE | TOLUENE | LAMP OIL | CARBON TETRACHLORIDE | REFRIGERANTS

TOXICITY

CNS and myocardial depressants, but increased risk of dysrhythmias (e.g. VF) with adrenergic drugs (e.g. albuterol, epinephrine, exercise, emotional/excitement reactions)

Certain halogenated hydrocarbons have specific toxic effects (e.g. methylene chloride produces carbon monoxide in the body)

SIGNS AND SYMPTOMS

Somnolence
Agitation
Emesis
Hypoxia
Some agents may cause severe GI burns - Consult Poison Control.
Inhaled can cause hypoxemia

TREATMENT

Control flammable and explosive residues on clothing.

Provide supportive treatment; avoid beta-agonists (albuterol, epi, etc.) if possible.

If ocular exposure, irrigate eyes to preclude corneal damage.

Follow ACLS algorithms for ventricular dysrhythmias (e.g. lidocaine, amiodarone), consider consultation or beta-blockade (e.g. esmolol) for refractory or recurrent ventricular dysrhythmia.
IRRITANT GASES
EXAMPLES: AMMONIA, CHLORINE, PHOSGENE

TOXICITY
Irritates respiratory tract, but causes no major systemic effects
Make sure HF is not involved (see corrosives)
Ammonia is highly water soluble = immediate upper airway symptoms
Chlorine moderately water soluble = upper and lower airway symptoms
Phosgene is less water soluble = delayed and lower airway symptoms

SIGNS AND SYMPTOMS
Airway irritation
Stridor
Airway swelling
Eye irritation
Immediate or delayed pulmonary edema

TREATMENT
Provide supportive airway management (may include intubation, oxygen, bronchodilators, BiPAP).
For eye injuries, administer analgesia and anesthetic eye drops, irrigation.
CONTACT POISON CONTROL.
For exposure to lower solubility agents (e.g. phosgene), observe for 6h for delayed symptoms.
INFORMATION TO GATHER

EXPOSED INDIVIDUAL: ____________________________

EXPOSURE DATE & TIME: ____________________________

DURATION OF EXPOSURE: _SECONDS _MINUTES _HOURS _DAYS _WEEKS _MONTHS

PATIENT ARRIVAL DATE & TIME: ____________________________

ROUTE OF EXPOSURE INHALATION: CONTACT_____ INGESTION_____ COMBINATION_____

OTHER: ____________________________

WHERE EXPOSURE OCCURRED: CLOSED SPACE_____ OUTSIDE_____ COMBINATION_____

OTHER: ____________________________

NAME & PHONE NO. OF FIRST RESPONDER: ____________________________

CHEMICAL NAME OF SUSPECTED SUBSTANCE: ____________________________

IS SAMPLE AVAILABLE FOR TESTING? YES_____ NO_____

SUBSTANCE PROPERTIES: POWDER_____ LIQUID_____ SOLID_____ GAS_____

ODOR_____ COLOR_____ VOLUME SPILLED_____

DESCRIBE DECONTAMINATION PROVIDED AT THE SITE OF EXPOSURE: ____________________________

PRE-HOSPITAL CARE: ____________________________
BLOOD SPECIMEN

Collect specimens from each person involved in an unusual chemical-exposure event. Please consult with the Minnesota Department of Health 612-282-3750

PEDIATRIC:
COLLECT URINE ONLY UNLESS OTHERWISE DIRECTED BY THE CDC. (SEE URINE SPECIMEN CARD)

ADULT:
FOR EACH PATIENT, COLLECT SAMPLES IN THE FOLLOWING ORDER:
1. COLLECT A MINIMUM OF 12 mL OF BLOOD IN PURPLE-TOP EDTA TUBES.
2. COLLECT 3 mL OF BLOOD IN ONE GREEN OR GREY-TOP TUBE.
3. COLLECT AT LEAST 25 mL OF URINE IN A SCREW-CAP URINE CUP. (SEE URINE SPECIMEN CARD)

COLLECT
1. FIRST DRAW PURPLE TOP TUBES (DO NOT USE GEL SEPARATORS) COLLECT A MINIMUM OF 12 mL
2. THEN DRAW GRAY OR GREEN TOP TUBES (DO NOT USE GEL SEPARATORS) COLLECT 3-7 mL IN ONE TUBE

LABEL
USING INDELIBLE INK, LABEL EACH BLOOD TUBE IN ORDER OF COLLECTION, 1-3 OR 4.
PLACE HOSPITAL OR CLINIC LABEL ON BLOOD TUBES

MIX
MIX EACH TUBE BY INVERTING 5-6 TIMES.

STORE
STORE BLOOD SAMPLES AT 4-8°C DO NOT FREEZE.
URINE SPECIMEN

Collect specimens from each person involved in an unusual chemical-exposure event. Please consult with the Minnesota Department of Health 612-282-3750

PEDIATRIC: COLLECT URINE ONLY UNLESS OTHERWISE DIRECTED BY THE CDC.

ADULT: IN ADDITION TO THE BLOOD TUBES (SEE BLOOD SPECIMEN CARD), COLLECT AT LEAST 25 mL OF URINE IN A SCREW CAP URINE CUP FOR EACH PATIENT.

COLLECT
MINIMUM 25 mL SPECIMEN
COLLECT IN A SCREW-CAP URINE CUP

LABEL
LABEL THE URINE CUP WITH THE APPROPRIATE HOSPITAL/CLINIC LABEL AS SHOWN.
INDICATE HOW THE SAMPLE WAS COLLECTED IF METHOD WAS OTHER THAN “CLEAN CATCH”.

STORE
FREEZE URINE SPECIMENS AT -70°C.
IF -70°C IS NOT AVAILABLE, PLACE IN THE COLDEST LOCATION AVAILABLE. RAPID FREEZING IS RECOMMENDED.