R7DHRE Hazardous Materials Guideline: Hydrazine

Region VII Disaster Health Response Ecosystem

REGION VII DISASTER HEALTH RESPONSE ECOSYSTEM (R7DHRE)

CHEMICAL SPECIALTY TEAM

Call Your Poison Center for Immediate Assistance: 1-800-222-1222

Hazardous Materials Guideline: Hydrazine

This document is intended as a supplement for discussion with your local poison center or toxicologist.

1.0 BACKGROUND

1.1 Description: Hydrazine is a colorless, corrosive, flammable, fuming, oily liquid that reacts violently with oxidizing substances, acids, and certain metals. Vapors of hydrazine are slightly heavier than air. Hydrazine will spontaneously ignite when adsorbed onto porous materials such as wood and clothes. When it is heated to decomposition, hydrazine can produce toxic nitrogen oxides. Hydrazine has an ammonia-like or "fishy" odor. Water can be used to decontaminate patients exposed to hydrazine liquid or vapors.

1.2 Mechanism of Injury: Hydrazine may cause systemic symptoms in patients. Seizures and neurological changes caused by hydrazine may be related to a functional depletion of pyridoxine (vitamin B6).

1.3 Routes of Exposure: Inhalation, Dermal, Ocular, Ingestion.

2.0 PROVIDER SAFETY

2.1 Personal Protective Equipment (PPE) – Decontamination Team: Personnel decontaminating patients must wear **full-body chemical-resistant clothing and respiratory protection**. Respiratory protection may consist of either:

2.1.1 A positive pressure air or oxygen source, such as an air-line respirator or a Self-Contained Breathing Apparatus (SCBA) or

2.1.2 A filtered air respirator (including Powered Air Purifying Respirators (PAPRs)) with filters capable of adsorbing hydrazine.

2.1.3 A positive pressure air or oxygen source is preferred if there is doubt as to the identity of the chemical in question or if there may be exposure to a level of hydrazine which would overwhelm the filter.

2.2 Personal Protective Equipment (PPE) – Treatment Team: Personnel treating patients who have been adequately decontaminated need no additional PPE other than universal precautions since there is no serious risk of secondary contamination.

2.2.1 The vomitus from persons who have ingested hydrazine is hazardous because it may off-gas hydrazine vapors or contaminate those coming in contact with the vomit. Prepare treatment areas for rapid clean up in case the patient vomits.

2.3 Patient Decontamination: Those persons contaminated with liquid hydrazine do pose a risk of secondary contamination from off-gassing of hydrazine vapors and direct contact with the liquid. Also, there is a risk of spontaneous ignition in those patients who have hydrazine on their clothing.

2.3.1 If there is concern for a presence of solid (non-hydrazine) substances, brush any powder or solids from the skin, hair, and clothes of victims.

2.3.2 Remove ALL clothing and jewelry. Double bag clothing and jewelry to prevent off-gassing.

2.3.3 Decontamination is best accomplished by irrigation with copious amounts of water.

2.3.3.1 Wash skin and hair with plain water for a minimum of 5 minutes and then wash twice with soap after washing with plain water. Washing with water alone (for a longer period of time) is acceptable if soap is not available.

2.3.4 Remove contact lenses if it can be done without additional trauma to the eye. Irrigate eyes for a minimum of 15 minutes. Continue irrigation until eye pH is neutral (7 to 8).

2.3.5 Watch for hypothermia in children and the elderly, when decontamination is done with un-heated water, or during cold weather.

3.0 SIGNS & SYMPTOMS

3.1 Severity of symptoms will depend upon the concentration of the hydrazine to which the person is exposed and the duration of exposure.

3.2 Inhalation: Irritation of the eyes, nose, throat, mucous membranes and respiratory tract; cough; dyspnea; pulmonary edema. Facial edema and salivation have also been reported.

3.3 Dermal: Skin irritation, itching, dermatitis, skin sensitization. Liquid exposures to the skin can cause severe burns. Eczema has been noted as a delayed effect.

3.4 Ocular: Irritation, corneal injury and burns to the eyes.

3.5 Ingestion: Ingestion can cause nausea, vomiting, abdominal pain and corrosive burns to the mouth, esophagus, and stomach. Nausea and vomiting can occur from ingestion or as a systemic effect.

3.6 Systemic: Hydrazine can be absorbed via the lungs, skin and to a lesser extent, the eyes. Systemic effects include:

- GI: Nausea and vomiting; liver toxicity with elevated LFT's and possibly liver necrosis.
- CNS: Dizziness, agitation, twitching, tremors, seizures, coma.
- Heme: Methemoglobinemia and/or hemolysis.
- Renal: Renal dysfunction may be caused directly by hydrazine or indirectly by hemolysis.
- CV: Hypotension from negative inotropic effects.

3.7 *Carcinogen*: Hydrazine is an animal carcinogen and is listed as possible carcinogen in humans.

4.0 DIAGNOSTICS

4.1 Hydrazine poisoning is a clinical diagnosis and there is no specific diagnostic testing. Any diagnostic evaluation should be based on sign and symptoms of irritation or corrosive effects.

5.0 TREATMENT

5.1 Follow standard Basic and Advanced Life Support Guidelines. There are specific antidotes for certain manifestations of hydrazine toxicity (see "Systemic" section below).

5.2 Inhalation: Maintain the patient's airway, with endotracheal intubation or cricothyroidotomy if necessary. Endotracheal intubation should be performed only under direct visualization because of edema and potential damage to the oropharynx. Support oxygenation and ventilation as necessary. Use standard treatments for pulmonary edema (diuretics, PEEP, etc.) and bronchospasm (inhaled bronchodilators; consider corticosteroids).

5.3 Dermal: Treatment is the same as that for thermal burns.

5.4 Ocular: Irrigate eyes to a neutral pH. Perform a thorough eye exam: test visual acuity and perform fluorescein and slit lamp examinations. Ophthalmology consultation may be necessary. Immediately consult an ophthalmologist for patients who have corneal injuries.

5.5 Ingestion: Do NOT give activated charcoal or induce emesis. Consider dilution by giving 2 to 4 ounces of milk or water orally ONLY to patients who are conscious, able to swallow, and are able to protect their airway. Endoscopic evaluation may be necessary.

5.6 Systemic:

5.6.1 CNS: Pyridoxine (vitamin B6) may have an antidotal effect in those patients with seizures, coma, and other neurological symptoms. Dosing of pyridoxine is 5 grams for adults or 70 mg/kg for children; it is administered intravenously over 30 minutes.

5.6.2 Hematologic: Patients with methemoglobinemia can be treated with methylene blue, 1 to 2 milligrams/kilogram/dose, given intravenously over 5 minutes. Because methylene blue can cause or enhance hemolysis, the clinician needs to weigh the risks and benefits of administering methylene blue to patients exposed to hydrazine who have both methemoglobinemia and hemolysis.

Disclaimer: This guideline is intended to be an informational reference only and should not be used as a substitute for consultation with a poison center or toxicologist, and/or the clinical judgement of the bedside team.

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