R7DHRE Hazardous Materials Guideline: Strychnine

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: Strychnine

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

1.0 BACKGROUND

1.1 Description: Strychnine is an odorless and colorless crystalline powder. It is available commercially in a salt form (usually nitrate, sulfate, or phosphate). There were numerous historical uses for strychnine, including as a rodenticide, veterinary use, and even medical indications for humans. At this time, there is no indication for human use of strychnine, though there have been rare reports of strychnine being used as an adulterant in illicit substances.

1.2 Mechanism of Injury: Strychnine is a competitive inhibitor of glycine, an inhibitory neurotransmitter. Strychnine causes systemic tetanic skeletal muscle contractions which can quickly lead to generalized seizures, respiratory failure, and death.

1.3 Routes of Exposure: Inhalation, Dermal, 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 strychnine.

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 strychnine 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 If the victim has ingested strychnine, toxic vomitus may also pose a danger either through direct contact with the vomitus or off-gassing of vapor. Prepare the treatment areas (ambulance, ER, etc.) for rapid clean up in case the victim vomits toxic material.

2.3 Patient Decontamination:

2.3.1 Those persons contaminated with vapors, liquids or solids pose a risk of secondary contamination from off-gassing of vapors and direct contact with the chemical.

2.3.2 Brush any powder or solids from the skin, hair, and clothes of victims.

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

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

2.3.4.1 Wash skin and hair with plain water for a minimum of 5 minutes and then wash twice with soap after washing with plain water.

2.3.4.1.1 Washing twice with soap after washing with plain water is recommended, especially for oily or otherwise adherent chemicals.

2.3.4.1.2 Washing with water alone (for a longer period of time) is acceptable if soap is not available.

2.3.5 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).

2.3.6 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 strychnine to which the person is exposed and the duration of exposure.

3.2 Inhalation: May result in irritation of the eyes, nose throat and upper airway; lacrimation and rhinorrhea; cough, bronchoconstriction, and shortness of breath.

3.3 Dermal: Dermal exposure is unlikely to produce any dermal symptoms more than irritation or tingling at the site of exposure.

3.4 Ingestion: Ingestion may lead to nausea and vomiting, along with systemic effects.

3.5 Systemic: Systemic effects can occur after ingestion, inhalation, or transdermal absorption of strychnine. In general, symptoms occur within 5 minutes of inhaling strychnine and within 15-30 minutes of ingesting strychnine. Onset of systemic symptoms may be delayed 12 or more hours after transdermal absorption of strychnine.

3.5.1 Vitals: Elevated temperature secondary to muscle activity and seizures. Early in the clinical course, HR, BP, and RR will also be elevated. When the patient's condition deteriorates, bradycardia, hypotension and apnea will predominate.

3.5.2 Musculoskeletal: Twitching, cramping, hyperreflexia, painful muscle spasms, tetanic muscle contractions, trismus, risus sardonicus, opisthotonos, rhabdomyolysis.

3.5.3 Eye: Horizontal nystagmus, blurred vision.

3.5.4 Neurologic: Agitation, heightened sensitivity to stimulation. Mental status is clear initially, but will deteriorate into delirium, obtundation and coma as the patient's condition deteriorates.

3.5.5 Cardiovascular: Diaphragmatic paralysis leading to respiratory arrest.

3.5.6 Renal: Renal failure from rhabdomyolysis.

4.0 DIAGNOSTICS

4.1 Strychnine poisoning is a clinical diagnosis and there is no specific diagnostic testing. Any diagnostic evaluation should be based on signs and symptoms present.

4.2 Consider basic labs for any symptomatic patient.

4.2.1 Consider creatinine kinase, lactic acid.

4.2.2 Recommend blood gas if patient is having ventilatory failure from diaphragmatic paralysis.

5.0 TREATMENT

5.1 Follow standard Basic and Advanced Life Support Guidelines.

5.2 Inhalation: Maintain the patient's airway, with endotracheal intubation if necessary. Support oxygenation and ventilation as necessary. Use standard treatments for pulmonary edema (diuretics, PEEP, etc.) and bronchospasm (inhaled bronchodilators; 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: The use of activated charcoal in strychnine ingestions is generally not recommended given the propensity for these patients to have seizures soon after ingestion. Dilution generally is also not recommended.

5.6 Systemic:

5.6.1 Treat agitation, muscle contractions and seizures with large doses of benzodiazepines (BDZ).

5.6.2 Use barbiturates or propofol for muscle hyperactivity and seizures not controlled by BDZs.

5.6.3 Pharmaceutical paralysis (with endotracheal intubation) may be necessary to treat recurrent muscle spasms, persistent seizures, respiratory failure, or hyperthermia not responding to BDZ, barbiturates or propofol. Continuous EEG monitoring is recommended while the patient is paralyzed to assure there is no ongoing seizure activity. Succinylcholine should be used with caution, if at all, since these patients frequently already have rhabdomyolysis and hyperkalemia.

5.6.4 Decrease external stimuli (loud noise, bright light, etc.) as much as is reasonable.

5.6.5 Treat hyperthermia with standard cooling measures; monitor core temperature.

5.6.6 Monitor for rhabdomyolysis, myoglobinuria and renal failure. Treat rhabdomyolysis with IV fluids.

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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