J04: Hydrogen Sulfide

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Reviewed:

Introduction

Hydrogen sulfide (H_2S) is a colorless gas with a characteristic odor of rotten eggs that is a product of the decomposition of sulfur-containing organic materials. It occurs naturally in fossil fuel deposits, sulfurous rocks, and is also released from hot tar and asphalt. Accidents involving H_2S have occurred in mines, caves, oil fields, petroleum refineries, sewers, liquid manure storage tanks, agricultural facilities, and the cargo holds of fishing boats.

Chemical suicides using common household products to create H_2S gas are becoming more common.

The toxicity of H_2S depends on concentration and the duration of exposure. Most deaths occur at the scene as a result of respiratory paralysis, also known as "knockdown." Trauma may also occur as a result of falls following a loss of consciousness.

Essentials

- CLINICALL CONSULTATION (1-833-829-4099) IS MANDATORY IN CASES OF SUSPECTED H_2S EXPOSURE
- Prompt rescue and treatment can save lives. Rescue of unconscious victims must only be undertaken by trained personnel equipped with self-contained breathing apparatus and appropriate protective clothing. Atmospheric gas monitoring is mandatory.
- Decontamination is required. Remove and dispose of clothing.
- Inhalation of high concentrations of H_2S causes immediate respiratory paralysis and a rapid loss of consciousness, followed shortly by death from asphyxia.
- Patients who are ventilated immediately following rescue often recover completely. Those who remain unconscious for longer periods of time are at risk for permanent hypoxic brain injuries.

Additional Treatment Information

- Early endotracheal intubation and mechanical ventilation with high concentrations of oxygen is recommended in patients with central nervous system depression or respiratory distress
- Patients with respiratory paralysis may not begin breathing spontaneously for hours
- Aspiration and pulmonary edema may develop in severe cases

Referral Information

Patients who are asymptomatic should be observed for at least several hours following their exposure.

General Information

- H_2S is highly toxic. The characteristic odour of the gas is an unreliable predictor of danger; prolonged exposure to low concentrations of H_2S, or brief exposures to higher concentrations results in olfactory fatigue, and renders individuals insensitive to the smell.
- At concentrations between 50 and 100 ppm, H_2S is irritating to lungs, mucosal membranes, and eyes. Prolonged exposure at this level may cause pulmonary edema.
- Concentrations above 500 ppm may produce severe toxicity within minutes. A single breath at concentrations between 800 and 1,000 ppm may be rapidly fatal.
- The toxicity of H_2S is due to its ability to paralyze respiratory muscles and produce profound hypoxia.

Interventions

First Responder

- Decontaminate patients in open air
  - → PR05: Patient Decontamination
- Provide supplemental oxygen and ventilation as required. Use high-flow devices. Provide airway management as required.
  - → B01: Airway Management
  - → A07: Oxygen and Medication Administration
- Flush exposed skin and eyes with warm water

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider CPAP or PEEP for patients with developing pulmonary edema
  - → PR09: Continuous Positive Airway Pressure
  - → PR10: Positive End Expiratory Pressure
- Consider vascular access and fluid replacement for hypotension
  - → D03: Vascular Access

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Apply a staged approach to oxygenation and ventilation in cases of significant CNS depression
- Control seizures as required
  - → F02: Seizures

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider sodium nitrite. Contact DPIC or CliniCall for additional guidance.