

# J04: Hydrogen Sulfide

Robert MacMillan

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## Introduction

Hydrogen sulfide (H<sub>2</sub>S) is a colourless 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<sub>2</sub>S 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<sub>2</sub>S gas are becoming more common.

The toxicity of H<sub>2</sub>S depends on the 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

- [OnCall consultation required](#) when attending cases of suspected H<sub>2</sub>S exposure.
- Prompt rescue and treatment can save lives. Rescue of unconscious victims must only be undertaken by trained personnel equipped with self-contained breathing apparatuses and appropriate protective clothing. Atmospheric gas monitoring is mandatory.
- Decontamination is required. Remove and dispose of clothing.
- Inhalation of high concentrations of H<sub>2</sub>S causes immediate respiratory paralysis and a rapid loss of consciousness, followed shortly after 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 exposure.

## General Information

- H<sub>2</sub>S is highly toxic. The characteristic odour of the gas is an unreliable predictor of danger; prolonged exposure to low concentrations of H<sub>2</sub>S, or brief exposures to higher concentrations, results in olfactory fatigue and renders individuals insensitive to the smell.
- At concentrations between 50-100 ppm, H<sub>2</sub>S is irritating to lungs, mucosal membranes, and eyes. Prolonged exposure at this level may cause pulmonary edema.
- Concentrations > 500 ppm may produce severe toxicity within minutes. A single breath at concentrations between 800-1,000 ppm may be rapidly fatal.
- The toxicity of H<sub>2</sub>S is due to its ability to paralyze respiratory muscles and produce profound hypoxia.

## Interventions

**First Responder**

- Decontaminate patients in open air
  - → [PR05: Patient Decontamination](#)
  - Flush exposed skin and eyes with warm water
- Keep the patient warm and protect from further heat loss
- Place the patient in a position of comfort, as permitted by clinical condition
- Provide supplemental oxygen and ventilation as required; use high-flow devices; provide airway management as required
  - → [B01: Airway Management](#)
  - → [A07: Oxygen Administration](#)

**Emergency Medical Responder – All FR interventions, plus:**

- [OnCall consultation required](#) when attending cases of suspected H2S exposure for hazard control and care planning purposes.

**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 DPC \(1-800-567-8911\) or ETP for additional guidance](#)

