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Chemical Emergency Medical Guideline

Information and recommendations for first responders and patients

Formaldehyde

CAS No.: 50-00-0

GHS symbols:

GHS05
Corrosive

GHS06
Acute toxicity

GHS08
Health hazard

Signal word: Danger

Hazard statements:

H314	Causes severe skin burns and serious eye damage.
H317	May cause allergic skin reactions.
H330	Fatal if inhaled.
H335	May cause respiratory irritation.
H341	May cause genetic defects.
H350	May cause cancer.
H301+H311	Toxic if swallowed or in contact with skin.

Overview

- There is no danger from contact with patients who have only been exposed to formaldehyde gas or vapors. A patient who is wet with liquid formaldehyde or formaldehyde solutions, or whose clothing is wet with these substances, may endanger other people through direct contact or through formaldehyde gas emissions.
- Formaldehyde is highly irritating to the skin, eyes and upper respiratory tract and causes eye irritation, coughing, chest pain and breathing difficulties. Laryngeal spasms and signs of fluid accumulation in the lungs (shortness of breath, blue-red discoloration of the skin and mucous membranes, sputum and coughing) may occur. Sensitisation through skin contact is possible.
- There is no known specific antidote. Treatment depends on the extent of exposure and the symptoms.

Table of Contents

1. Information about the substance

Formaldehyde (HCHO), CAS 50-00-0
Synonyms: formalin, formic aldehyde, methanal,
At room temperature, formaldehyde is an almost colorless gas with a sharp or pungent odor. The vapors are flammable and explosive. Since the gas tends to polymerize, it is usually marketed as a 30-50% aqueous solution with up to 15% methanol as a stabilizer.
Formaldehyde is an important starting material in the manufacture of plastics, resins and urea-formaldehyde insulating foams. Resins containing formaldehyde are used in building materials (chipboard) and are used in paper production and in the manufacture of floor coverings, paints and furniture.

2. Exposition

2.1. Inhalation

Inhalation and local contact are the main routes of exposure to formaldehyde. The smell and irritant effect of formaldehyde act as a clear warning. However, chronic exposure to low concentrations can lead to a dulling of the sense of smell and the irritant effects. As formaldehyde is heavier than air, there is a risk of suffocation in poorly ventilated, low-lying or enclosed spaces.

2.2. Skin/eye contact

Exposure of the skin or eyes to formaldehyde vapors or aqueous solutions can cause irritation or chemical burns.

2.3. Ingestion

Ingestion of formaldehyde solutions can cause severe burns to the esophagus and stomach. Nausea, vomiting, diarrhea and stomach pain may occur.

3. Acute health effects

In most cases, exposure to formaldehyde occurs through inhalation of the gas or vapors or through formaldehyde solution splashing onto the skin or into the eyes. Low concentration causes irritation of the eyes, nose and throat, with watery eyes, coughing and shortness of breath. Higher concentrations can cause severe breathing difficulties and ultimately lead to chemically induced lung damage and death. Swallowing small amounts of aqueous solution can cause throat irritation, chest pain and vomiting. Larger amounts can cause chemical burns, blue discoloration of the skin and mucous membranes, and death.

Formaldehyde causes irritation of the eyes and upper respiratory tract (throat irritation, coughing). At high concentrations, it can quickly lead to breathing difficulties with chest pain, shortness of breath, laryngeal spasms and fluid accumulation in the lungs. The symptoms may increase over time. Massive exposure can lead to respiratory and cardiovascular failure.

If the skin is wet or damp, contact with gaseous or vaporous formaldehyde or aqueous solutions can cause burning pain, inflammation and blisters. Low concentration can cause eye irritation with burning, redness, tearing and eyelid closure. High concentrations or contact with liquid formaldehyde can cause chemical burns and corneal opacity.

A single, short-term exposure to low concentrations, from which the affected person recovers quickly, does not normally cause delayed or lasting damage to health. After inhaling relevant amounts of formaldehyde, permanent respiratory disorders and increased susceptibility to lung infections have been reported.

Difficulty swallowing may occur after ingestion. Sensitization through skin contact is possible.

4. Measures

4.1. Self-protection of first responders

If there is a suspicion that the area the helper must enter contains formaldehyde, a self-contained breathing apparatus and a chemical protection suit must be worn. Contaminated equipment should not be used.
There is no danger from contact with patients who have only been exposed to formaldehyde gas or vapors. A patient who is wet with liquid formaldehyde, or whose clothing is wet with liquid formaldehyde, may endanger other people through direct contact or through formaldehyde gas or vapor.

4.2. Rescue

Patients should be removed from the danger zone immediately. If they are unable to walk unaided, they should be removed from the danger zone quickly using appropriate means, taking care to protect themselves. The "A, B, C procedure" then has absolute priority.

A) Clear the airways (check for blockages caused by the tongue or foreign objects)
B) Ventilation (check the patient's breathing, if necessary, begin ventilation with adequate self-protection, e.g. breathing mask)
C) Circulation (begin resuscitation for any person who does not respond to verbal commands and is not breathing normally)

4.3. Cleaning

Patients who have only been exposed to gaseous or vapor formaldehyde and show no signs of skin or eye irritation do not require any special cleaning measures, unlike all others.
If possible, patients should assist in their own decontamination. If liquid formaldehyde has been exposed and clothing is contaminated, it must be removed and securely wrapped.
Rinse affected skin and hair with water for at least 15 minutes. Protect eyes while rinsing. Continue other important emergency measures in the meantime.
If the eyes have been exposed to formaldehyde or if there is eye irritation, rinse with water or neutral saline solution for 15 minutes. Remove any contact lenses, if possible, without additional risk to the eye.

4.4. Further measures

Anyone who may have been exposed to formaldehyde should seek medical attention immediately.

4.5. Instructions for further rules of conduct

Consult your family doctor or the emergency department of the nearest hospital if any abnormalities or symptoms occur within the next 24 hours, in particular:

- Coughing, wheezing or whistling breath
- Difficulty breathing or shortness of breath
- Increased pain or abnormalities in the affected skin areas or eyes
- Pain or tightness in the chest

5. References

Berufsgenossenschaft der chemischen Industrie, Hrsg. Formaldehyd / Paraformaldehyd. Heidelberg: Jedermann-Verlag, 1991. (Merkblätter für gefährliche Arbeitsstoffe; M 010.)

Buttgereit F, Dimmeler S, Neugebauer E, Burmester GR. Wirkungsmechanismen der hochdosierten Glucocorticoidtherapie. Dtsch Med Wschr 1996; 121: 248-252.

Deutsche Forschungsgemeinschaft, Senatskommission zur Prüfung gesundheitsschädlicher Arbeitsstoffe, Arbeitsmedizinisch-toxikologische Begründung von MAK-Werten. Wiley-VCH Verlag, Weinheim, 1998.

Diller WF. Anmerkungen zum Unglück in Bhopal. Dtsch Med Wschr 1985; 110: 1749-1751.

Ellenhorn MJ, Schonwald S, Ordog G, Wasserberger J. Ellenhorn's Medical Toxicology: Diagnosis and Treatment of Human Poisoning. 2nd ed. Baltimore: Williams & Wilkins, 1997: 1214-1217.

Goldfrank LR, Flomenbaum NE, Lewin NA, Weisman RS, Howland MA, Hoffman RS. Toxicologic Emergencies. 6th ed. Norwalk: Appleton & Lange, 1998: 1053-1054, 1362, 1365-1366, 1526, 1742.

Pandey CK, Agarwal A, Baronia A, Singh N. Toxicity of ingested formalin and its management. Human & Experimental Toxicology 2000; 19: 360-366.

U.S. Department of Health & Human Services - Agency for Toxic Substances and Disease Registry, ed. Formaldehydine. Atlanta, 1994. (Managing Hazardous Materials Incidents; vol III.)

Foncerrada G et al, Safety of Nebulized Epinephrine in Smoke Inhalation Injury, J Burn Care Res 2017;38:396–402

Walker PGF et al, Diagnosis and management of inhalation injury: an updated review, Critical Care (2015) 19:351

Olasveengen TM, Semeraro F, et. Al: European Resuscitation Council Guidelines 2021: Basic Life Support. Resuscitation 2021, 161: 98-114

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