

Environment, health, & safety

Glutaraldehyde and ethylene oxide: Health and safety precautions

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For many years, nurses have worked with the sterilizing agents glutaraldehyde and ethylene oxide (EtO), which can affect patients, healthcare workers, and environmental health. Around since the 1960s, glutaraldehyde is an equipment disinfectant that requires cold sterilization. An oily, colorless liquid, it's frequently used to disinfect endoscopes, bronchoscopes, dialysis equipment, respiratory equipment, and surgical instruments. It's also used to develop X-rays and as a tissue fixative in laboratories.

Glutaraldehyde has various health effects. Occupational asthma in certain workers exposed to glutaraldehyde vapors has been documented, according to the Occupational Safety and Health Administration (OSHA). Endoscopy nurses have developed skin sensitization. Other reported effects include rhinitis; contact dermatitis; hives; skin, nose, throat and respiratory irritation; nausea; headache; drowsiness; epistaxis; dizziness; and hand staining. Nurses may be exposed to glutaraldehyde during such activities as pouring it into a container system, opening the container system to insert instruments for disinfection or to remove disinfected items, and handling glutaraldehyde-soaked items.

Glutaraldehyde may have environmental health effects, too. In various studies, researchers have found links between glutaraldehyde in waste water leading to water contamination disrupting aquatic life, particularly with algae and fish embryos.

Alternatives to glutaraldehyde exist. If and when making a change from glutaraldehyde, consider the potential hazards and efficacy of these alternatives. Seek guidance from an infection control nurse, the safety committee, and occupational health personnel in this important decision.

To prevent glutaraldehyde exposure, the National Institute for Occupational Safety and Health (NIOSH) recommends specific engineering controls, work practices, and personal protective equipment. Most importantly, be sure to attend all mandatory employer training regarding use of and exposure to this agent. For more information, visit www.cdc.gov/niosh.

Ethylene oxide hazards

EtO is a flammable, explosive gas used to sterilize heat- or moisture-sensitive surgical equipment. Nurses can be

exposed to it during sterilization procedures, from contact with EtO-sterilized equipment, or when caring for victims of EtO exposure.

Acute exposure may lead to multiple symptoms, including skin and mucous-membrane irritation, nose and throat irritation, respiratory distress, nausea and vomiting, and skin reactions. Serious effects from high-dose exposure include seizures, loss of consciousness, and coma. Frostbite can occur during dermal contact with EtO in liquid form. Chronic exposure may result in neuropathy, cataracts, corneal burns, and liver or kidney damage. Studies also show EtO is a human and animal carcinogen.

In addition, EtO is of concern for persons in their childbearing years. The U.S. Agency for Toxic Substances & Disease Registry (ATSDR) states that it's a teratogen and genotoxin. It's one of the agents listed in Reproductive and Developmental Toxicants, published by the U.S. General Accounting Office. According to the ATSDR, patients who have repeated contact with medical equipment sterilized by EtO (such as dialysis patients) may experience sensitization and a potentially immediate and fatal allergic reaction.

Environmental effects of EtO can be difficult to determine. Australia's Department of Environment and Water Resources states that acute effects may include animal death, plant death, and a low growth rate in plants; also, EtO is moderately toxic to aquatic life. Chronic effects may include a decreased lifespan, reproductive problems, and reduced fertility rates.

Alternatives to EtO include steam sterilization, peracetic acid, hydrogen peroxide plasma gas, and ozone. Unfortunately, steam can damage heat- or moisture-sensitive equipment, peracetic acid is highly toxic, hydrogen peroxide plasma gas can't process all types of endoscopes, and ozone is a respiratory irritant and a pollutant.

Obviously, nurses need to be aware of the hazards posed by these two chemicals. Knowledge of the chemical right-to-know project, proper protective equipment, adequate environmental controls, and thorough training are vital, as are easily accessible and current material safety data sheets on glutaraldehyde and EtO. Also, more effective and less toxic alternatives need to be developed. Today's health care requires disinfection and sterilization techniques that protect the patient, the caregiver, and the environment. ★

Visit www.AmericanNurseToday.com for a list of selected references.

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