Environment, health, and safety

Understanding the dangers of waste anesthetic gases

By Katie Slavin, MS, RN

Waste anesthetic gases (WAGs) occur when small amounts of volatile anesthetic gases leak from a patient's anesthetic breathing circuit or are exhaled by patients recovering from anesthesia. WAGs include both nitrous oxide and halogenated anesthetic gases (such as halothane, enflurane, isoflurane, desflurane, and sevoflurane). Exposure to WAGs poses a threat to hospital workers, including nurse-anesthetists, operating-room (OR) nurses, recovery-room nurses, surgeons, and other OR/recovery-room staff. Nurses should be aware of the potential effects of WAGs and be knowledgeable on methods to take appropriate precautions.

Exposure to WAGs most frequently occurs in operating facilities with nonexistent or poorly functioning automatic ventilation or scavenging systems, as well as in recovery rooms where WAGs exhaled by recovering patients aren't properly vented or scavenged. Exposure also may occur from leaks in the anesthetic breathing circuit, when anesthetic gases escape during system hookup and disconnection, during anesthesia induction, and when anesthetic gas seeps over the lip of the patient's mask—for example, if poorly fitted. (See *Ways to reduce exposure to waste anesthetic gases*.)

Of great concern is the fact that anesthetic gases can't be detected by their odor until concentrations are very high. For instance, halothane can't be detected by 50% of the general population until its concentration is more than 125 times the exposure limit recommended by the National Institute for Occupational Safety and Health.

Health effects of exposure to high concentrations of WAGs (even for a brief period) include headache, irritability, fatigue, nausea, drowsiness, judgment and coordination difficulties, and liver and kidney disease. While some studies report no adverse health effects from long-term exposure to low concentrations of WAGs, several studies have linked such exposure to miscarriages, genetic damage, and cancer among OR workers.

Nurses working in OR and recovery-room units must advocate for reduction of exposure to WAGs in their departments to protect their health and the health of surrounding staff. ★

Ways to reduce exposure to waste anesthetic gases

The National Institute for Occupational Safety and Health recommends that operating-room personnel use the following methods to reduce their exposure to waste anesthetic gases (WAGs).

- Inspect the anesthetic delivery system before each use, checking for breaks and irregularities.
- As part of the daily machine check, inspect the patient's breathing circuit for negative and positive pressure relief.
- Turn on the room or local ventilation system.
- Make sure scavenging equipment is properly connected.
- Connect the gas outlet to the hospital's central scavenging system.
- Start the gas flow after the laryngeal mask or endotracheal tube has been installed.
- Fill vaporizers under a ceiling-mounted hood with an active evacuation system.
- Fill vaporizers before or after the anesthetic procedure.
- Make sure uncuffed endotracheal tubes create a completely sealed airway.
- Use the lowest anesthetic gas flow rates possible for proper functioning of the anesthesia delivery system and for patient safety.
- Avoid very high anesthetic gas flow rates, to prevent leaks. High flow rates generate more WAGs than low flow rates.
- Don't deliver anesthesia by open drop (dripping liquid volatile anesthetic onto gauze).
- When a mask is used, make sure it fits the patient well.
- Eliminate residual gases through the scavenging system to the extent possible before disconnecting a patient from a breathing system.
- Turn off the gas before turning off the breathing system.

In some facilities, not all of the above tasks are nursing responsibilities. Nonetheless, nurses should become familiar with the proper procedures to protect themselves and educate appropriate staff.

Source: National Institute for Occupational Safety and Health. *Waste Anesthetic Gases—Occupational Hazards in Hospitals*. Atlanta, GA: Centers for Disease Control & Prevention; 2007. NIOSH Publication No. 2007-151.

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