Correspondence

Ethylene Oxide Sterilization of Anesthesia Apparatus

To the Editor—The responsibility of the anesthesiologist for safety as well as the sterility of equipment is a fundamental consideration in the care of patients. The desirability of providing each patient with a sterile tracheal tube and breathing circuit has gained widespread acceptance. As much of this equipment cannot readily be autoclaved without damage, Snow et al., in 1962, recommended ethylene oxide gas sterilization, a method now widely used.

The possible hazards of ethylene oxide residues were not appreciated until a Sectional Committee of the American National Standards Institute appointed an Ethylene Oxide Sub-Committee organized for industry-wide investigation of the problem. Their findings and interim recommendations were made available to anesthesiologists at the 1969 annual meeting of the ASA in San Francisco. The general guidelines for the use of ethylene oxide suggested have earned the unanimous approval of the ASA Sub-Committee on Standardization. In view of the wide use of ethylene oxide sterilization, the Ethylene Oxide Sub-Committee of the American National Standards Institute will continue to study this problem.

The essential hazards of ethylene-oxide sterilization procedures are: a) foreign material or bacteria may remain on objects because of inadequate prior cleaning; b) sterilization may be incomplete owing to inappropriate wrapping; c) residues of ethylene oxide itself, or some byproduct such as ethyleneglycol or ethylenechlorohydrin, may persist in the sterilized item in significant quantities at the time of use.

Hazards of the method may be circumvented by the simple expedients suggested in the report:  

1. Polyvinylchloride or rubber materials sterilized with ethylene oxide should not be used within SEVEN DAYS following sterilization, if stored at room temperature.

2. A properly designed aerator heated to 50 °C may be used to reduce safe aeration time to 12-18 hours.

3. Polyethylene (3-5 mil) and paper wrap are the best packaging materials. Nylon and polyvinilidene chloride (e.g., Saran Wrap) are less permeable to ethylene oxide; polyvinylchloride delays elution.

4. Polyvinylchloride objects which have been gamma-irradiated should not be resterilized with ethylene oxide because significant amounts of ethylenechlorohydrin will be formed.

5. "Disposable" items should be discarded after use because the byproducts of later ethylene oxide sterilization may be injurious because of ethylenechlorohydrin in particular.

6. Water droplets should be removed from material to be sterilized in order to prevent the formation of ethylene glycol.

7. Biological indicators should be used as a frequent check on the effectiveness of sterilization.

These recommendations, which cannot be considered as "standard," should nevertheless be studied and understood by anesthesiologists who either sterilize their own equipment or use devices sterilized by ethylene oxide.

It should be noted also that unmixed ethylene oxide forms explosive atmospheres with air and oxygen. The sterilizer and aerators must, therefore, be dealt with according to the same principles which govern the use of flammable anesthetic agents.

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Sectional Committee Z-79, and  
ASA Sub-Committee on Standardization  
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References
