

## Occupational Safety and Health Administration acts on guidelines for electrosurgical smoke

The Occupational Safety and Health Administration (OSHA) sent a draft of the long-awaited guidelines, *Information for Health Care Workers Exposed to Laser and Electrosurgical Smoke*, to external reviewers in March 1998. Dr Ralph Yodaiken, MD, MPH, senior medical advisor for OSHA, announced this action at the 1998 AORN pre-Congress seminar, "Hazards of smoke in the OR," on March 28, 1998, in Orlando, Fla. The smoke document had been in review at OSHA since December 1996. It recognizes Margaret Savage, MD; AORN Board of Directors member Brenda Ulmer, RN, MN, CNOR; and Drew Baldwin for their assistance in framing the revised guidelines. With final OSHA signatures, it was sent to more than 20 external reviewers. Any pertinent comments by the reviewers then could be incorporated into the document before final publication.

The 20-page document covers

- personnel;
- workplaces;
- types of electrosurgery units (ESUs);
- types of lasers;
- physical hazards of lasers and ESUs;
- constituents of smoke;
- pathophysiologic effects of smoke;
- infectious potential of laser and ESU plume;
- methods of protection, including engineering controls and personal protective equipment;

- conclusions; and
- recommendations.

The document is intended to offer guidance for people who are exposed to laser and electrosurgery smoke in work settings, including surgeons, RNs, anesthesiologists, and surgical technologists. An estimated 350,000 workers are exposed to smoke each year.<sup>1</sup> The workplaces affected include all sites using ESUs or lasers, including physicians' offices and clinics.

### EFFECTS OF SMOKE

The document explains the tissue effect of different types of lasers and ESUs. Smoke is said to contain carbonized tissue and blood, airborne particles, and various chemicals and gases. The components of surgical smoke are well documented in the literature. Complaints of personnel exposed to smoke include nausea, headaches, and eye and upper respiratory irritation. Particle sizes are discussed, as well as information from the National Institute of Safety and Health (NIOSH) on the presence of carcinogenic organic compounds. As a result of some of these findings, NIOSH issued a hazard alert in September 1996 on surgical smoke.<sup>2</sup> Particulate size and morphology of laser and electrosurgery smoke are discussed.

The document further discusses the possible effects of smoke on the lung. A paper published in 1988 is used as a reference for the effects of smoke on the lungs of laboratory rats.<sup>3</sup> Potential of

mutagenesis and carcinogenesis, viral and bacterial, that affect humans also is discussed. Methods of protection are outlined and include engineering controls, such as mechanical smoke evacuation, masks, and respirators.

The document concludes that pyrolysis with ESUs and lasers produce products that may be associated with acute irritant effects. The smoke that is produced contains respirable particles of carbonized tissue that may contain infectious material, such as bacteria and viruses that may transmit infection. Hazards of lasers and ESUs can include burns and fires. The effects of smoke, however, have not yet been shown to cause neoplasia in humans.

### RECOMMENDATIONS

The document recommends that surgical smoke should be removed and properly filtered by a smoke evacuation system as close to the surgical site as possible. It further is noted that personal protective equipment should be worn where engineering controls are not used or are inadequate. Traditional surgical masks are not adequate to protect workers, and all staff members exposed to laser or ESU smoke should wear respirators. The document states that health care workers should be educated about the known and potential dangers of ESU and laser smoke. Warnings that lasers reflect beams and should be used only by trained, qualified personnel are implied in the document.

**UNITED SUPPORT**

The scope of the OSHA document is similar to the 1996 NIOSH alert. The release of the draft document follows two years of efforts by AORN, ANA, and concerned individuals. One major effort included a congressional letter spearheaded by Congressman Carlos Romero-Barcelo (D-Puerto Rico) to urge OSHA to include ESUs in the revision of guidelines for laser use in surgical settings. Many members of Congress also contacted OSHA to urge release of this document.

AORN and the AORN Foundation hosted two national conferences in January 1996 and February 1997 on the hazards of surgical smoke. The meetings convened public and private stakeholders to discuss recent research on surgical smoke and concerns about the quality of air in ORs and other facilities in which surgical procedures expose patients and personnel to possible danger from smoke associated with lasers, ESUs, and powered instruments. The 1996 meeting resulted in consensus that smoke from ESUs should be treated the same as smoke from lasers; government agencies (eg, OSHA) should apply the same regulations to smoke from ESUs as applied to laser smoke; and further investigations

should be conducted on the hazards of surgical smoke.

The 1997 smoke meeting was meant to discuss collaborative efforts regarding smoke-related safety issues in the OR and to review any new research on the

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issue. The American Society of Anesthesiologists, the Association of Surgical Technologists, the Joint Commission on Accreditation of Health Care Organizations, and the American College of Surgeons also attended the meeting. The participation of representatives from these groups helped to broaden the discussion, which directly focused on the need for well-designed and reliable studies of surgical smoke hazards. Dr Yodaiken, a participant at the 1997 meeting, summarized the

meeting results by stating that stakeholders must determine the effect of surgical smoke on significant work absences, its effect on the number of injuries, available equipment to alleviate the problem, and the economic impact of potential government regulation.

Diverse groups working together to establish guidelines on smoke produced by lasers and ESUs in surgical procedures is an important milestone in health care. This is an example of professional associations, RNs, physicians, industry representatives, and government officials working together to achieve a greater good. The combined efforts of these groups can be used as a template for future challenges in health care policy.

The comment period for the external reviewers was reported as being approximately 30 days. It is prudent, however, to monitor progress on the review and to maintain contact with OSHA to determine the final publication of the document. Please address comments or questions to Candace Romig at (800) 755-2676 x 8263 (cromig@aorn.org) or Brenda Ulmer at (770) 923-3286 (BulmerRN@aol.com).

**BRENDA ULMER  
RN, MN, CNOR  
AORN BOARD OF DIRECTORS**

1. Occupational Safety and Health Administration, *Information for Health Care Workers Exposed to Laser and Electrosurgery Smoke* (1998).

2. National Institute for Occupational Safety and Health. *Control of Smoke from Laser/Electric Surgical*

*Procedures*, publ no 96-128 (Washington, DC: National Institute for Occupational Safety and Health, 1996).

3. M S Baggish, P Baltoyannis, E Sze, "Protection of the rat lung from the harmful effects of laser smoke." *Lasers in Surgery and Medicine* (August 1988) 248-253.