

**INSIDE**

- Reduce cancellations and delays with collaborative practice patterns 28
- Are you in danger of being sued over credentialing for lap procedures? 29
- 5 areas in which you can simplify your job 31
- With pay for performance, staff satisfaction with salaries increases 25% 32
- Some patients go home the same day with coronary stenting technique 34
- **In brief:** Most common SDS procedure; calendar of upcoming conferences 36
- **Enclosed in this issue:** Patient/family collaborative practice patterns for laparoscopic cholecystectomy, hernia repair, breast biopsy, and partial mastectomy with axillary node dissection; NIOSH hazard controls brief; pay-for-performance standards

1997**VOL. 21, NO. 3**
(pages 25-36)American Health Consultants® is
A Medical Economics Company

Dangerous plume in the operating room: It's not just for lasers anymore

Electrosurgery smoke contains toxic gases too, SDS managers warned

While the word has been out for many years about the dangers of laser plume, there's a new alarm being sounded about the plume generated by electrocautery and other thermal cutting methods: That plume may be equally hazardous — or more so, researchers warn.

The problem with smoke from laser and electrical surgical procedures is so serious that the Washington, DC-based National Institute for Occupational Safety and Health (NIOSH) sent out a *Hazard Controls* notice in October. The notice warned:

- "Research studies have confirmed that this smoke plume can contain toxic gases and vapors such as benzene, hydrogen cyanide, and formaldehyde, bioaerosols, dead and live cellular material (including blood fragments), and viruses.
- "At high concentrations, the smoke causes ocular and upper respiratory tract irritation in health care personnel and creates visual

20 years later, and SDS is still going strong

In April 1977, American Health Consultants launched *Same-Day Surgery (SDS)* with articles that discussed cost containment and elimination of routine preop tests. Twenty years later, SDS is still committed to offering practical information to help you cut costs and survive the huge challenges that have emerged, including managed care.

In this issue, we discuss some of the hottest topics in same-day surgery, including the hazards of plume from thermal cutting methods; reduction of delays, cancellations, and unplanned admissions; risk management when credentialing laparoscopic procedures; simplification of your job; and a pay-for-performance program that dramatically improves employee satisfaction.

We hope you enjoy this edition of *Same-Day Surgery!*

problems for the surgeon.

- "The smoke has unpleasant odors and has been shown to have mutagenic potential."¹ (See entire *Hazard Controls* notice enclosed in this issue of *Same-Day Surgery*.)

It's nothing to sneeze at. One study shows that electrocautery plume, even after filtration, may be as hazardous as filtered laser plume,² says **John C. West**, JD, MHA, director of risk management and staff counsel at Catholic Health Initiatives, a health care system based in Cincinnati. The problem is widespread. Electrosurgical units are used in 85% of all surgical procedures, says **Brenda Ulmer**, RN, MN, CNOR, senior clinical educator at Boulder, CO-based Valley Lab.

Since the tip of the electrosurgery active electrode heats to 7,000°, many OR personnel have wrongly assumed that it sterilizes the smoke contents, Ulmer says.

"When tissues are vaporized, the cell contents aren't sterilized or killed," she says. "Lasers vaporize tissues and release them into the atmosphere. Electrosurgery does the same."

EXECUTIVE SUMMARY

The hazards of smoke from electrocautery and other thermal cutting methods are getting new attention from nursing organizations, industry experts, and even the federal government. Research indicates the smoke may be as hazardous, or more so, than laser plume.

- OSHA is drafting revisions to the 1991 *Guidelines for Laser Safety and Hazard Assessment*.
- Experts recommend using smoke evacuators that are portable, user-friendly, and have variable power settings and an ULPA filtration system. The nozzle should be maintained within two inches of the operative site, with suitable filtration and a flow rate of at least 40 cubic feet per minute.

C. Eugene Moss, health physicist at the National Institute for Occupational Safety and Health in Cincinnati, is primary author of the *Hazard Controls* notice. Moss says he decided that the notice was needed after attending a roundtable on surgical smoke sponsored by the Denver-based Association of Operating Room Nurses (AORN) in January 1996.

Surgical staff 'still not getting the message'

"I was surprised at the people who didn't know about the dangers of surgical smoke," Moss says. "Some people, some percentage, are not getting the message."

And the federal government isn't the only one getting involved. Consider these other developments:

- A Coalition for the Protection of Operating Room Personnel has been formed and has lobbied Congress to pressure regulatory agencies, such as the Washington, DC-based Occupational Safety and Health Administration (OSHA), to address the need to evacuate surgical smoke. (For more information on the coalition, see source box, p. 27.)

"The ultimate goal is to have OSHA issue a compliance directive — similar to universal precautions — in other words, [have OSHA say] smoke should be evacuated to protect health care workers," Ulmer says.

- OSHA is looking at revising the 1991 *Guidelines for Laser Safety and Hazard Assessment* (OSHA Publication 8-1.7) to include the hazards of surgical smoke and suggest appropriate methods of addressing those hazards, says **Ralph Yodaiken**, MD, senior medical advisor at OSHA.

In fact, draft revised guidelines have been developed, but not released. The release of revised guidelines may be held up by the wait for a new assistant secretary, Yodaiken says. There also is the possibility of a required standard addressing smoke evacuation, he says.

COMING IN FUTURE MONTHS

■ New same-day surgery Web sites

■ Negotiating rates with payers: Tips from experts

■ Avoiding liability with nurse anesthetists and anesthesiologists

■ Answers to your most common questions from the Joint Commission

■ Cost-cutting in the OR: Tips from your peers

- Carlos Romero-Barcello, a nonvoting member of Congress from Puerto Rico, is gathering signatures of fellow members for an encouragement letter to Joseph A. Dear, assistant secretary of OSHA, asking that as the guidelines are revised, OSHA take action to protect OR personnel from the dangers of surgical smoke. At press time, the letter had not been mailed.

Basically, the hope is that OSHA would require equipment to be used for the evacuation of surgical smoke, Ulmer says.

Some members of Congress already are sending letters to OSHA asking what the agency is going to do about the problem, Yodaiken says.

- At press time, AORN had scheduled a follow-up meeting to last year's roundtable. Industry and government representatives will be discussing their efforts regarding surgical smoke.

So what do all these efforts mean for the same-day surgery manager? "The evidence to date indicates that hospitals [and surgery centers] would be well-advised to implement control programs for both laser and electrocautery smoke in the operating room," West says.

Moss agrees. "It's not rocket science," he says, referring to smoke evacuators, ventilation systems, filter disposal, and emphasis on bloodborne pathogens.

Don't rely on masks alone

Masks alone aren't sufficient, West emphasizes.

"As a general rule, masks should be the last resort in attempting to protect employees, rather than the first line of defense," he says. "The ordinary surgical mask is intended to protect the patient from the breath of the surgeon or other personnel in the OR. They are not intended to protect the health care provider."

Even a high-efficiency particulate air (HEPA) mask will not filter out any gases or vapors in the plume, West warns.

Also, general ventilation controls, usually expressed as room air changes per hour, shouldn't be relied on as the sole method for removing contaminants from the air because they are inefficient, says West.

So what is effective? Smoke evacuators, say surgical smoke experts. West points to research by two teams of NIOSH investigators that has confirmed smoke evacuators are useful in controlling plume.^{3,4}

"When purchasing a smoke evacuator, make sure it is easy to use or the surgeons won't use

it," Ulmer warns. The device should be portable, she advises. Ulmer recommends a hand-held plastic device that attaches to the electrosurgical pencil and evacuates the smoke as it is generated. (See list of vendors in source box, below.)

Buy one with a nozzle that can be maintained

SOURCES

For more information on the dangers of surgical smoke, contact:

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For more information on the AORN roundtable meetings, contact:

- **Candace Romig**, Legislative Program Coordinator, Health Policy Analyst, Association of Operating Room Nurses, 2170 S. Parker Road, Suite 300, Denver, CO 80231-5711. Telephone: (303) 755-6304, Ext. 263. Fax: (303) 750-3462. E-mail: Cromig@aorn.org.

For more information on the Coalition for the Protection of Operating Room Personnel, contact:

- **Jim Albertine**, Albertine Enterprises, 1156 15th St. NW, Suite 505, Washington, DC 20005. Telephone: (202) 659-2979. Fax: (202) 659-3020.

The April 1997 issue of *Health Devices* will include an evaluation of surgical smoke evaluation systems. To purchase this issue, which costs \$200, contact:

- **ECRI**, 5200 Butler Pike, Plymouth Meeting, PA 19462-1298. Telephone: (610) 825-6000. Ext: 307. Fax: (610) 834-1275.

For more information on smoke evacuators, contact:

- Clinical Information Specialist, **Valley Lab**, 5920 Longbow Drive, Boulder, CO 50301. Telephone: (800) 255-8522. Ext. 2005. Fax: (303) 530-6285. E-mail: voeckxd15@pfizer.com. World Wide Web: www.pfizer.com/valleylab.
- **Lea Galang**, Olsen Electrosurgical, 2100 Meridian Park Blvd., Concord, CA 94520. Telephone: (800) 227-2814, Ext. 21. Fax: (510) 685-6177.

within two inches of the operative site, with suitable filtration and a flow rate of at least 40 cubic feet per minute, West says.

Ulmer recommends a smoke evacuator with variable power settings, "because not all procedures produce the same amount of smoke," she says. "You don't want something evacuating 50 cubic feet per minute when all you need is 10 to 15."

The system should have an ultra-low penetrating air (ULPA) filtration system, Ulmer says.

This triple filter system is the most effective at capturing a wide range of viral and bacterial particles, she says.

References

1. National Institute for Occupational Safety and Health. *Hazard Controls: Control of Smoke from Laser/Electric Surgical Procedures*. Washington, DC; 1996.
2. Wenig BL, Stenson KM, Wenig BM, et al. Effects of the plume produced by the ND:YAG laser and electrocautery on the respiratory system. *Lasers Surg Med* 1993; 13(2):242-245.
3. Bryant C, Gorman R, Stewart J, et al. *NIOSH Health Hazard Evaluation Report: Bryn Mawr Hospital, Bryn Mawr, PA*. NIOSH Publication No. 85-126-1932. Washington, DC; September 1988.
4. Moss CE, Bryant C, Stewart J, et al. *NIOSH Health Hazard Evaluation Report: University of Utah Health Sciences Center, Salt Lake City, UT*. NIOSH Publication No. 88-101-2008. Washington, DC; February 1990. ■

Collaborative practice patterns cut cancellations

Patients, families report high satisfaction

It's the morning of surgery. You've just learned that your elderly patient has no one to take care of her after surgery, and she's confused about the incentive spirometer that you're going to give her to take home, even though you discussed both of these points in the preoperative telephone interview.

Don't throw up your hands in frustration just yet if your preoperative patient education isn't working. One hospital reports success using patient/family collaborative practice patterns to educate patients and their significant others before the day of surgery. Telling them what to expect and prepare for has helped reduce delays,

cancellations, and unplanned admissions by 75%.

On top of that, 88% of patients say the information given to them in the pre-op interview about their upcoming surgery and what to prepare for and expect *exceeded* their expectations in its usefulness to them.

"It's much higher than we expected," says Rita Ash-Borden, RN, director of surgical services at Walter O. Boswell Memorial Hospital in Sun City, AZ. Ash-Borden attributes that success to patient/family collaborative practice patterns that are shown to patients and their friends and family members at the preoperative visit, several days before surgery.

The collaborative practice patterns are critical pathways that cover diet; medications; equipment and tubes; treatments and tests; activity; and education and teaching. (See four examples enclosed in this issue of *Same-Day Surgery*.) The patterns are physician-specific.

Get family buy-in

Patients and their significant others review the practice patterns with a nurse at the preoperative visit. Nurses spend at least 30 minutes conducting the history and reviewing the appropriate collaborative practice patterns.

"It's a buy-in for the patient and the family," says JoAnne Andrews, RN, coordinator of the outpatient suite.

With the practice pattern in front of him or her, the nurse goes into great detail about what will happen on the day of surgery, including an explanation that, for example, the patient will be

EXECUTIVE SUMMARY

Walter O. Boswell Memorial Hospital in Sun City, AZ, has used patient/family collaborative practice patterns to reduce delays, cancellations, and unplanned admissions by 75%. (See samples of practice patterns enclosed in this issue of *Same-Day Surgery*.)

- The practice patterns operate like critical pathways and are physician-specific.
- Nurses review the patterns with patients and significant others at the preoperative visit.
- Eighty-eight percent of patients say the information given to them in the pre-op interview about their upcoming surgery and what to expect *exceeded* their expectations in its usefulness to them.