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Outpatient Surgery

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Stamping Out Electrosurgery Smoke

Why a smoke evacuation device must be in every surgical suite.

Kay Ball, PhD, RN, CNOR, FAAN



Did you know that perioperative nurses have twice the incidence of some respiratory problems as compared to the general population? This information surprised me too when the data from my doctoral research revealed this startling and unsettling fact.

Prevalence Comparison of Respiratory Conditions

Respiratory condition of perioperative nurses general population *

	Prevalence in study	Prevalence in U.S.
Allergies	24.23%	18.38%
Sinus infections/problems	22.93%	10.33%
Asthma	10.87%	6.4%
Bronchitis	9.04%	4.45%

* Note: Prevalence percentages from "Prevalence and Incidence: By Wrong Diagnosis, 2009." Retrieved March 25, 2009, from www.wrongdiagnosis.com.

"Prevalence Comparison of Respiratory Conditions" below represents the alarming prevalence of specific respiratory conditions as reported by the nurses participating in my research survey on surgical smoke compliance. This information is compared to the prevalence of respiratory conditions reported by the general U.S. population.

Surgeons are not immune to this workplace hazard either. There have been reports of surgeons contracting diseases potentially caused from pathogens transmitted within surgical smoke. One surgeon, who was known to vaporize condyloma without using a smoke evacuator, developed laryngeal papillomatosis. When his throat lesions were biopsied, the same DNA strains were found in his throat lesions that are normally found in anogenital warts. Other physicians have informally reported conjunctival lesions, nasal growths and respiratory problems probably caused from surgical smoke exposure. Even ophthalmologists have complained about the odor of surgical smoke during LASIK procedures when visible smoke is not even observed.

These reports only lead to the question, "What are we breathing in the OR?" We must control surgical smoke to

minimize and even eliminate respiratory hazards.

Like Smoking 6 Cigarettes

Scientists have long known that exposure to laser plumes and surgical smoke in the OR can be carcinogenic. Breathing in 1 gram of laser-ablated tissue in the OR is equal to smoking 3 cigarettes according to Japanese researcher T. Tomita. In the same study, the author wrote that breathing in 1 gram of electrocautery smoke is equal to smoking 6 cigarettes.

The culprit: electrosurgery smoke

The key to controlling the hazards of surgical smoke is to employ proper smoke evacuation practices when "hot" tools are used to cut and coagulate tissue. Laser plume appears to be evacuated appropriately in most facilities (Edwards & Reiman, 2008), but electrosurgery smoke is still being ignored and is allowed to infiltrate our surgical suites. Electrosurgery pencils are now available with a smoke tube surrounding the electrosurgery blade. This design lets you evacuate smoke at the site of production, causing a vortex movement of the plume. These ESU pencils have been ergonomically constructed to provide operator comfort, increased visibility and effective smoke evacuation.

Yet even though devices and equipment are available, compliance with smoke evacuation recommendations is still lacking in most facilities. My PhD research to identify key indicators of compliance with surgical smoke recommendations reported the vast inconsistencies in surgical smoke evacuation practices. Indicators of compliance include strong leadership support and easy-to-follow and use smoke evacuation policies and equipment.

One of the most powerful factors of whether the nurse is compliant with smoke evacuation recommendations is if the nurse received training and education about surgical smoke hazards and evacuation practices.

The results of compliance research also highlight 4 major barriers to proper smoke evacuation that the nurse participants identified. The most common obstacles that keep nurses from complying with smoke evacuation recommendations are:

- Smoke evacuation equipment is not available.
- The surgeon says smoke evacuation is not needed.
- The noise smoke evacuators produce.
- Staff is complacent (and just can't be bothered with smoke evacuation).

These findings are based on a survey of 777 nurses I conducted as part of my dissertation. Interestingly, I found that freestanding ambulatory surgery centers are more likely to evacuate smoke than hospitals, as are larger or urban facilities.

Attacking the problem

By recognizing the major barriers to compliance, surgical team members can begin to address each one of them individually to initiate a 100% smoke-free surgical environment. Some ideas for you to consider:

- Perioperative nurses and physicians can discuss the need to have a smoke evacuator in every operating room

so that smoke evacuation devices are always available.

- Surgeons can be educated on the importance of appropriate smoke evacuation practices, while their procedure cards must reflect smoke evacuation equipment and supplies for all surgical procedures that generate plume.
- Many facilities may have outdated smoke evacuators that are very noisy when activated. Consider replacing these systems with the newer, quieter models to minimize this bothersome noise in the OR.
- Staff complacency is the most difficult barrier to tackle.
- The nurses who want to practice in an environment without air contamination must promote their passion for clean air, serve as mentors to others who want to follow smoke-evacuation guidelines, and educate their colleagues about the hazards of inhaling surgical smoke.
- Since the presence of surgical smoke is a workplace hazard, administrators must mandate smoke-evacuation practices to provide a safe environment, or someday OSHA may be knocking at the door.

Are You Compliant With AORN's Surgical Smoke Recommendation?

In April 2008, the Association of periOperative Registered Nurses established what may be the most strongly- and specifically-worded official warning to date on surgical smoke and bio-aerosols.

"AORN believes that exposure to surgical smoke and bio-aerosols can and should be controlled," the statement reads. "Healthcare professionals are responsible for learning about surgical smoke and bio-aerosols and taking steps to minimize the risks associated with these hazards."

The statement includes a list of steps that surgical administrators and personnel are recommended to follow in order to reduce the risks inherent in surgical smoke and bio-aerosols.

These steps include the increased and efficient use of exhaust ventilation, smoke evacuation and filtration systems; the proper use of such personal protective equipment as high-filtration masks, eye wear and gloves; the development and implementation of education and training programs to help demonstrate competency; and the documentation of actions taken.

— *David Bernard*

How are you doing?

So are your smoke evacuation practices effective in removing all of the surgical smoke created in your operating room? Or are you continually breathing in the toxic gases, tiny particles and potentially disease-forming contaminants found in surgical smoke? Research articles have documented the many hazards of surgical smoke.

Organizations and agencies have published detailed recommendations to guide practitioners in the proper evacuation of surgical smoke. AORN's smoke evacuation tool kit can be accessed easily by all AORN members (www.aorn.org) to provide guidance on taking that first step toward a smoke-free surgical environment (tool kit includes a PowerPoint presentation, sample policy, competency checklist, bibliography of smoke articles, links to smoke evacuation vendors and creative signs to post throughout the OR to promote smoke evacuation).

The references are abundant, the solutions are easy. Smoke evacuation must be used to provide clean air in the OR. Don't let surgical smoke invade your lungs. Be the leader in your OR in achieving a 100% smoke-free environment.

On the Web

Thinking of Buying...Smoke Evacuation System www.outpatientsurgery.net/issues/2008/06/thinking-of-buying-a-smoke-evacuation-system

Toward a Smoke-Free OR www.outpatientsurgery.net/guides/employee-safety/2008/toward-a-smoke-free-or

Are Your ORs Smoke Free? www.outpatientsurgery.net/issues/2009/12/are-your-ors-smoke-free

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- Edwards, B.E. & Reiman, R.E. (2008). Results of survey on current surgical smoke control practices. AORN Journal. 87(4):739-749.
- Hallmo, P., & Naess, O. (1991). Laryngeal papillomatosis with human papillomavirus DNA contracted by a laser surgeon. European Archives of Oto-Rhino-Laryngology. 248(7):425-7.

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