

## Where There's Smoke...

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The problem of surgical smoke in the operating room extends beyond the obvious concerns related to patient and staff safety.

Hospital administrators and staff are rightfully aware of the need to prevent exposure to surgical smoke due to its potential to negatively affect the health of both the individuals being operated on and those tasked with conducting or assisting with the procedures. However, to suggest surgical smoke evacuation is simply a safety issue is to oversimplify it. There are a number of variables to consider, with cost of acquiring surgical smoke evacuation products, efficiency, and performance being chief among them.

“Hospitals are looking for the most effective product, at an economical price point, which is easy for their clinicians to utilize,” says Janis Dezso, Vice-President of Sales and Marketing for Bovie Medical, a manufacturer of digital electro-surgical generators and accessories for hospital operating rooms and surgicenters.

Richard Fleenor, President and CEO of Pare Surgical, suggests smoke evacuation is something most hospital staff – from administrators to surgeons and nurses – looks at as a costly (but ultimately necessary) practice.

“There is no doubt it costs a lot of money,” he says. “There is a lot of noise associated with it in the operating rooms, and the surgeons don’t really care for it because of the drag on their [electrosurgery] pencils, but they are willing to put up

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with it.”

They are willing to put up with it because the Center for Disease Control and Prevention (CDC) and other organizations state that surgical smoke is hazardous to the health of both patients and healthcare personnel. According to the CDC, research studies have confirmed surgical smoke – in plume or aerosol form – can contain toxic gases and vapors. These include benzene, hydrogen cyanide, formaldehyde, bioaerosols, dead and live cellular material, and viruses.

Furthermore, the CDC and the Association of Perioperative Nurses (AORN) both cite a number of different ailments and symptoms connected to exposure to high levels of surgical smoke, some of which are serious. They include ocular and upper respiratory tract irritation, nausea, dizziness, fatigue and skin irritation for hospital personnel, as well as visual problems for surgeons. Furthermore, a 2010 study conducted by Ball found that perioperative nurses have twice the incidence of respiratory problems as the general population.

What is even more of a concern is the fact that surgical smoke can be created by a number of different devices, including lasers, powered surgical equipment, ultrasonic equipment, and more. According to AORN, powered surgical instruments can be overlooked as a source of contamination, despite being used in surgical procedures where there is often a significant amount of blood and tissue spray.

As a result, AORN recommends hospital staff employ the following measures to deal with surgical smoke:

- Wear appropriate personal protective equipment
- Remove smoke with an evacuation system for open procedures and MIS procedures
- Place a capture device close to the source of the smoke
- Use the aforementioned evacuation according to the manufacturer’s written instructions

Recommended ventilation efforts include some combination of general room and local exhaust ventilation. The two most prevalent approaches to local exhaust ventilation aimed to reduce surgical smoke levels are portable smoke evacuators and room suction systems.

According to the CDC, the smoke evacuator should have high efficiency in airborne particle reduction and a capture velocity of roughly 100-150 feet per minute at the inlet nozzle. Again, according to the CDC, use of a smoke evacuator is the most effective approach to local exhaust ventilation, while room suction systems are less effective because they pull at a lower rate and are more adept at capturing liquids, as opposed to gases or particulates.

Furthermore, the smoke evacuator or room suction hose nozzle inlet needs to be kept within two inches of the surgical site or it will not effectively capture airborne contaminants. Also, a high efficiency particulate air filter (or something equivalent) is recommended for trapping particulates. At the completion of the procedure all

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tubing, filters, and absorbers must be considered infectious waste and be disposed of appropriately. New filters and tubing should be installed on the smoke evacuator for each procedure.

The first smoke evacuators on the market did not offer the level of performance many hospitals expect and receive from the technology available today. Simply stated, they were loud, cumbersome, and used multiple filters.

However, improvements have come with passing time. Today, manufacturers offer units that are quieter, easier to use, and portable. While multi-stage filters are used, they are often easier to change.

“Additionally, manufacturers have developed accessories that increase efficiency in the operative theater, including remote activation and pencil adapters,” says Dezso, adding that the pencil adapters allow smoke evacuation to be at the surgeon’s fingertips. As a result, she states, no longer does an operating room nurse have to hold the tube to allow the surgeon more freedom to operate on the patient.

The products today perform better, are easier to use, and have more features. However, that is not enough to satisfy hospitals. The product needs to be a cost-effective and efficient means for dealing with surgical smoke.

“For our customers, the most important characteristics that allow for safe smoke evacuation are clinical effectiveness, efficiency, and value,” says Sherri Lloyd, Product Marketing Manager at Buffalo Filter, a provider of smoke evacuation products. “Ultimately, our clients are seeking to provide a safe surgical environment for their employees and patients, and performance of all aspects of this system is essential.”

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