

# Thinking of Buying...A Surgical Smoke Evacuation System

Consider filtration, convenience and noise to ensure OR use.

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One unavoidable by-product of the electrocauteries and lasers that have increased efficiency, convenience and patient safety in many surgical procedures is the smoke their use generates. Surgical smoke not only nauseates OR staff and irritates their eyes and respiratory systems, it also exposes them to potentially infectious and carcinogenic risks.

In its recommended practice on the subject, AORN states that "patients and perioperative personnel should be protected from inhaling smoke generated during electrosurgery," and urges the use of evacuators as close as possible to the source of the smoke. The CDC's National Institute for Occupational Safety and Health and the American National Standards Institute have issued similar non-regulatory statements.

In spite of studies and recommendations on the subject, the use of surgical smoke evacuators is still not a standard practice in many ORs. If you're considering purchasing smoke evacuation systems for your ORs, here are some factors to keep in mind in order to make sure that, once installed, your system is used.

## Permanence or portability

Surgical smoke evacuation systems are available in two types: portable equipment that you'll add to your OR and stationary systems that you'll build into it. Portable systems currently dominate the market, but if you're building a surgery center from the ground up or planning a major renovation of your facility, you might consider the built-in systems as an option.

Stationary systems, like plumbing or a boom or other capital equipment, are a major commitment. Once installed, their suction and venting components are a permanent part of your surgical suite. Users of stationary smoke filtration systems say that they're easy to use, quieter than portable equipment and don't require much in the way of hands-on maintenance. On the other hand, such ventilation may not offer efficient enough suction capability to evacuate the smoke from each procedure.

While portable smoke evacuation systems will unavoidably take up space in your OR, their ventilation hoses — some of which have a capture velocity of 50 cubic feet per minute at the nozzle — let them work much closer to the site of the tissue ablation. As a result, portable systems are more effective in managing the removal of surgical smoke.

## Filtration factors

When reviewing your smoke evacuation options, educate yourself on the type of filters and the particle filtration efficiency and size each system offers. These factors are key to determining the equipment's effectiveness in protecting your OR employees.

An evacuator system generally consists of a sterile tubing through which contaminants are suctioned; a series of pre-filter media designed to capture solids and absorb liquids; and an ultra low penetration air filter, either by itself or in combination with a high efficiency particulate air filter, for the smoke particles.

ULPA and HEPA filters contain several layers of filtering media, including charcoal for odor elimination. They share similar technology, but ULPA is more efficient than HEPA on the microbial level. A HEPA filter removes particles as small as 0.3 micron for a removal efficiency of 99.99 percent. However, since most viruses are smaller than 0.3 micron, the ULPA filter's ability to remove particles as small as 0.12 micron for an efficiency of 99.9995 percent makes the difference.

### Use, sound and size

Conduct hands-on trials of the units you're considering, not just for your surgeons and staff to judge ease of use, but to help them determine the amount of noise they can tolerate. Be certain to trial units that can turn on automatically when the electrocautery is in use as well as models with a foot-pedal feature. Several manufacturers also offer evacuator nozzles that can be clipped to stable equipment or mounted on a floor stand to free staff hands.

The amount of noise generated by a smoke evacuation system may seem trivial, but keep in mind that noise is a key reason why smoke evacuation units aren't always put to use in the OR. Most newer systems are quieter than the older ones were — it's a major selling point for manufacturers — but noise also depends on the total size and ceiling height of your room.

Smoke evacuation systems are also becoming more compact. Older systems were bulky and burdensome equipment, described as garage tool chests or filing cabinets in size. They were particularly inconvenient because the unit would take up space around the OR table while the ventilation hose — usually only about 10 feet long — was in use at the surgical site. Some newer systems are small and mobile enough to fit under the table, or able to serve the staff through a ceiling-mounted equipment boom.

Even a highly efficient, easy-to-use, quiet and compact smoke evacuation system does no one any good if it's not used. How can you overcome surgeon and staff resistance to turning them on? Unfortunately, there's no definitive answer, especially since federal and national safety agencies still haven't issued official rules on the subject of surgical smoke and its removal. But education goes a long way toward encouraging action.

Remind surgeons of the effects of the smoke on staff who spend a day in the OR, where it lingers. Mention that it also tends to impede their vision during procedures. Remember that trialing gets equipment into surgeons' hands, and sometimes changes their minds. You might also emphasize all the particular risks inherent in surgical smoke. Educating your nurses to be aware of the hazards around them and their patients helps to convey the message that what may seem to be an inconvenient device in fact offers strong protection inside the OR doors.