

Clearing the Air on Surgical Smoke

Facts, Stats, and Recommendations

Surgical smoke, the by-product of many surgical procedures, may pose potential health risks for nearly one million hospital workers each year.¹

What is surgical smoke?

Surgical smoke is formed when energy-generating devices raise the intracellular temperature of tissue, causing tissue vaporization.²

What's in surgical smoke?

More than 150 different chemical constituents have been identified in surgical smoke, including carbon monoxide and formaldehyde^{3,5}

Bacteria and viruses have also been found in surgical smoke, including Hepatitis B, HIV, and HPV⁶

Smoke evacuation is recommended by leading regulatory bodies and industry associations¹²⁻¹⁴



What are the effects of surgical smoke?

Exposure to surgical smoke can cause both acute and chronic health effects ranging from eye, nose, and throat irritation to emphysema, asthma, and chronic bronchitis^{7,8}

Blended current electrosurgery can contain viable bacteria.⁹ Viral DNA has been discovered in surgical smoke.¹⁰

Surgical smoke impacts visibility of the surgical field, which may result in procedure delays¹¹

Evacuating Smoke from the OR

Traditional methods for OR smoke protection may have limitations

Wall Suction

- Only effective in procedures that produce a small amount of smoke¹²
- Not proven to remove smoke at its source¹³
- Produces a high level of noise¹¹

Surgical Masks

- Ineffective at filtering many substances from surgical smoke¹²
- Uncomfortable to wear, bulky fit, and can impede function¹²

FAST FACT
99%

One study showed a hand-held device captured 99% of surgical smoke when placed one inch from the source.¹¹

Desired features of handheld smoke evacuation devices

Handheld smoke evacuation devices are smaller in size and may address issues in the OR:

Visibility

- > Feature an adjustable shaft that helps position the smoke evacuation tip closer to the surgical site
- > Encapsulate the electrode for efficient smoke capture

Surgeon Comfort

- > Lightweight
- > Designed with a non-slip grip for comfort and control
- > Large activation buttons for ease of use
- > Cord in tubing for procedural flexibility

Efficiency

- > Adjustable shaft to minimize the need to exchange electrodes
- > Reduce eschar buildup
- > Designed to require less frequent cleaning and save OR time

1. Memon AG, Naeem Z, Zaman A, Zahid F (2016) Occupational health related concerns among surgeons. *Int J Health Sci* 10 (2): 279-291. 2. Spruce L (2018) Back to Basics: Protection From Surgical Smoke: 1.2 www.aornjournal.org/content/cme. *AORN J* 108 (1): 24-32. 3. Pierce JS, Lacey SE, Lippert JF, Lopez R, Franke JE (2011) Laser-generated air contaminants from medical laser applications: a state-of-the-science review of exposure characterization, health effects, and control. *Journal of Occupational and Environmental Hygiene* 8 (7): 447-466. 4. Beebe DS, Swica H, Carlson N, Palahniuk RJ, Goodale RL (1993) High levels of carbon monoxide are produced by electro-cautery of tissue during laparoscopic cholecystectomy. *Anesth Analg* 77 (2): 338-341. 5. Barrett WL, Garber SM (2003) Surgical smoke: a review of the literature. Is this just a lot of hot air? *Surg Endosc* 17 (6): 979-987. 6. Eickmann U, Falcy M, Fokuhl I, Rügger M, Bloch M et al. (2011) Surgical smoke: Risks and preventive measures. *International Section of the ISSA on prevention of occupational risks in health services Hamburg, Germany* 5-40. 7. Okoshi K, Kobayashi K, Kinoshita K, Tomizawa Y, Hasegawa S et al. (2015) Health risks associated with exposure to surgical smoke for surgeons and operation room personnel. *Surg Today* 45 (8): 957-965. 8. Prevention CfDCa (Web Page) NIOSH Study finds Healthcare Workers' Exposure to Surgical Smoke Still Common. Updated November 3, 2015. Available online at: <https://www.cdc.gov/niosh/updates/upd-11-03-15.html>. Accessed: November 5, 2018. 9. Schultz L (2015) Can Efficient Smoke Evacuation Limit Aerosolization of Bacteria? *AORN J* 102 (1): 7-14. 10. Christie D, Jefferson P, Ball DR (2005) Diathermy smoke and human health. *Anaesthesia* 60 (6): 632. 11. Wu JS, Luttmann DR, Meininger TA, Soper NJ (1997) Production and systemic absorption of toxic byproducts of tissue combustion during laparoscopic surgery. *Surg Endosc* 11 (11): 1075-1079. 12. Ulmer BC (2008) The hazards of surgical smoke. *AORN J* 87 (4): 721-734; quiz 735-728. 13. Hill DS, O'Neill JK, Powell RJ, Oliver DW (2012) Surgical smoke - a health hazard in the operating theatre: a study to quantify exposure and a survey of the use of smoke extractor systems in UK plastic surgery units. *J Plast Reconstr Aesthet Surg* 65 (7): 911-916.