

Change the Air Smoke Free OR

Facts, Stats, and Recommendations

Surgical smoke, gaseous by-product containing hazardous aerosols, may pose potential health risks for nearly 500 000 hospital workers each year.^{1,2,5,10}

What is surgical smoke?

Surgical smoke is formed when energy-generating devices raise the intracellular temperature of tissue, causing tissue vaporization. Smoke can also be described as surgical “plume,” “aerosol,” and “vapor”.^{3,5}

What’s in surgical smoke?

Surgical smoke is made up of 95% water or steam and 5% cellular debris in the form of particulate material, which is composed of chemicals, blood and tissue particles, viruses and bacteria.²

Approximately 150 different chemical constituents have been identified in surgical smoke, including carbon monoxide, hydrogen cyanide, acrylonitrile, formaldehyde and benzene.^{4,5}

Viable bacteria and Infectious viruses such as HIV (human immunodeficiency virus), HBV (hepatitis B virus) and HPV (human papillomavirus) have also been detected in surgical smoke.²

Smoke might be hazardous for the health of operating room personnel.²

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.⁶

Blended current electrosurgery can contain viable bacteria. Viral DNA has been discovered in surgical smoke and may lead to disease transmission.^{8,9,11}

Infectious agents contained in surgical smoke such as HIV (human immunodeficiency virus), HBV (hepatitis B virus) or HPV (human papillomavirus) can potentially cause infections in exposed individuals.^{7,11,15}

Operating theater nurses may have an increased prevalence of respiratory illnesses (sometimes twofold) compared to the general population.^{19,*}

Smoke evacuation is recommended by leading regulatory bodies and industry associations^{12,14,20-23}



Evacuating Smoke from the OR

Smoke evacuation is the ability to capture the smoke generated at the surgical site and route it to a collection site. Traditional methods for OR smoke protection may have limitations.¹³

Wall Suction

- Not proven to remove smoke at its source¹⁷
- Classical wall-mounted capture systems are generally not powerful enough to evacuate large quantities of smoke.²

Surgical Masks

- Although surgical masks provide a barrier to splashes and droplets impacting on the wearer's nose, mouth and respiratory tract, they do not provide protection against airborne aerosol particles: most surgical masks are designed to filter particles that are $\geq 5\mu\text{m}$.¹¹
- May be uncomfortable to wear and less effective if worn loosely or for too long¹⁶

FAST FACT
99%

Hand-held device was able to capture 99% of surgical smoke when placed one inch (2.54cm) from the source.*¹⁸

Widespread recommendations for using smoke evacuation systems

- **EORNA recommends** that "Plume/smoke evacuation systems should always be used during the procedure with heat-producing instruments or devices."²⁰
- In order to minimise the risks of smoke plume to all individuals in the perioperative environment, the use of specific smoke evacuation systems is advocated, **states IFPN guidelines**.²¹
- For large amounts of plume, an individual smoke evacuator unit or centralized system shall be used, **recommendations by HSE**.²²
- If preventative measures aren't enough to reduce the risks from the smoke plume to acceptable levels, then **MHRA recommends** using a smoke evacuator.²³

Factors that influence smoke capture

- Distance of the device from the source of smoke production
- Power of the suction source and its ability to produce a requisite minimum volume of airflow
- Internal diameter of the tubing that connects the capture device to the filter system placed, in line with the suction machine
- Amount of smoke produced during the procedure.²

Prevent bacteria in smoke from being aerosolized.⁸

*Unpublished author data, Schultz L, Olson B. November 21, 2011.

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