International Federation of Perioperative Nurses

IFPN Guideline
for
Smoke Plume

Introduction:

Healthcare workers are exposed to smoke plume when electro surgery, ultrasonic, or laser equipment is used during surgical interventions. The plume that is released into the atmosphere can contain many harmful substances such as carbonised tissue, blood borne pathogens, viral particulates, bacteria, toxic and/or carcinogenic chemicals and noxious gases, to name but a few potential constituents. On many occasions, smoke plume may actually be visible to the naked eye and usually is perceived as an unpleasant smoke smell. The plume can then be inhaled by perioperative staff and has been known to cause mucous membrane, ocular, respiratory and skin irritation. Further, smoke plume may reduce the surgeon's ability to visualise the surgical field, which can result in unsafe operating conditions.

It is important that Employers and Employees are aware of the problem of smoke plume and ensure that there are policies in place to reduce the exposure to smoke plume and that such policies also comply with workplace health and safety laws, or other legislative guidance, and with International Electro-technical Commission (IEC), standards pertinent to the particular healthcare setting.

Smoke Plume

Smoke plume or surgical smoke is a vaporous product that is generated when electro-cautery, electro-diathermy, or laser equipment is utilised in perioperative interventions. It is created by the rapid heating action that causes tissue membranes to rupture thus releasing a plume in the form of a bio aerosol that contains noxious and toxic materials.

There is also limited evidence that during laparoscopic procedures, the ultrafine particles in the smoke plume may be absorbed into the patient’s blood stream, potentially causing hypoxic stress.

GUIDELINE NUMBER	DATE RELEASED	DATE REVIEWED	REVIEW FREQENCY	DATE TO REVIEW POLICY
1012	2001	December 2021	Every 4 years	Dec 2025

International Federation of Perioperative Nurses

Action to reduce risks

Face Masks

It is recommended that all healthcare workers who are in an environment where smoke plume may be generated wear facemasks of 0.1-micron filtration level. However, it is important to recognise that facemasks do not provide first line of protection for filtration of surgical smoke. (IEC 60825-TR8)

- Use 0.1-micron facemasks to minimise the level of exposure to surgical smoke and particulate matter
- Masks must be properly fitted and worn, leaving no loose or gaping edges, which allow for peripheral leakage.
- As far as possible such masks should be single use and disposable to ensure that they are free from contamination
- Masks should be disposed of according to appropriate infection control guidelines for items contaminated with blood borne pathogens.

Smoke Evacuation systems

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. Local exhaust ventilation is the first line of protection and should be used wherever surgical smoke is generated.

- Smoke evacuation systems should be specifically designed for electro surgery and laser smoke plume, with ULPA filters (ultra-low penetrating air filters) that filter out particulates to 0.12 microns in size. This provides filtration of viral particulates. HEPA (high efficiency particulate air filters) provide 0.3-micron filtration, and provide only bacterial filtration, which does not capture viral particles, and should not be used for surgical smoke.
- Filters and other accessories should be changed/maintained in accordance with the manufacturer's guidance. Consumable items such as air filters that may require regular replacement should be replaced with the manufacturer's specific product/recommendations in order to ensure that the smoke evacuation unit operates at maximum efficiency.

GUIDELINE NUMBER	DATE RELEASED	DATE REVIEWED	REVIEW FREQENCY	DATE TO REVIEW POLICY
1012	2001	December 2021	Every 4 years	Dec 2025

- Filters, tubing, and all consumable accessories used with a smoke evacuator should be disposed of according to infection control procedures for blood borne pathogen contamination.
- The collection device of the smoke evacuator, should be in close proximity to the operative site, usually not more than 2cm, in order to ensure maximum smoke evacuation and visibility of the operative field
- Existing suction units in use in the perioperative environment should not be used for smoke evacuation, as they are not designed for this purpose, unless a 0.1micron in-line filter is placed between the wall outlet and the floor canister.

References:

- AORN 2019 **Standards, Recommended Practices and Guidelines.** Association of peri-Operative Registered Nurses, Denver, CO, USA.
- Fitzgerald J E et al **A single blind controlled study of electrocautery and ultrasonic scalpel smoke plumes in laparoscopic surgery**. Surgical Endoscopy 2012;26:337-42
- International Electrotechnical Commission (IEC) **Standards: 60825,**
- AfPP 2016 **Standards and Recommended Practices for Safe Perioperative Practice** Harrogate UK.

IFPN acknowledges 3M for the support provided to enable review of this perioperative standard.

GUIDELINE NUMBER	DATE RELEASED	DATE REVIEWED	REVIEW FREQENCY	DATE TO REVIEW POLICY
1012	2001	December 2021	Every 4 years	Dec 2025