Over the years, an increasing number of global organisations have scrutinised the potential hazards of surgical smoke. These include governments, workplace safety groups, clinical societies and quality organisations responsible for healthcare standards and accreditations.
Multiple Organisations. One Goal.

Protecting patients and staff from surgical smoke

Even without large randomised trials on surgical smoke, groups around the world have found the data compelling enough to warrant action, resulting in guidelines – and laws in some countries – to better protect theatre staff and patients. Of special concern is the reality that surgeons and theatre staff endure chronic, long-term exposure to the toxic gases and infectious particulate matter that smoke can carry, increasing their cumulative exposure and risk beyond what any one case report or study may have reported to date.

Here is a look at the many organisations united in their effort to provide a brighter tomorrow for today’s theatre practitioners. These recommendations and the engineering/device solutions within them can help optimise staff protection, satisfaction and focus by lessening the stress and distraction that come with worrying about hazardous exposure.

Published reports have identified roughly 150 chemical constituents of plume, including toxic and carcinogenic substances. Also identified were fine and ultra fine particulate matter, including viable cellular material, viruses and bacteria.

The Neptune E-SEP Smoke Evacuation Pencil captures smoke directly at the source as recommended by many organisations. Its use with The Neptune® Waste Management System delivers added benefits from the Neptune’s ULPA filter, trapping particulates ≥0.12 microns with a 99.99% efficiency rate. These device solutions provide tangible evidence of how you strive to meet OR air quality guidelines.

Examples of Chemicals in Smoke Plume
- Acrolein
- Benzene
- Carbon Monoxide
- Formaldehyde
- Hydrogen cyanide
- Methane
- Toluene
- Polycyclic aromatic hydrocarbons/PAH (EPA-identified priority pollutants)
Here are just some of the particles that can be smaller than lung damaging dust, thus named for its ability to reach the alveoli of those who inhale it. Standard surgical masks only filter out particles 5 microns or larger.

<table>
<thead>
<tr>
<th>Microns</th>
<th>Particle</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.001</td>
<td>HPV</td>
</tr>
<tr>
<td>0.01</td>
<td>Hepatitis B</td>
</tr>
<tr>
<td>0.1</td>
<td>Nazhatt (Laser)</td>
</tr>
<tr>
<td>1</td>
<td>Virus</td>
</tr>
<tr>
<td>10</td>
<td>Tobacco Smoker</td>
</tr>
<tr>
<td>100</td>
<td>Smallest Visible Particle</td>
</tr>
</tbody>
</table>

**Particle Sizes**

Operating Room Nurses Association of Canada (ORNAC)
Whenever electrosurgery is used, it should be used in conjunction with a smoke evacuator.
Recommended Practice

**Workplace Safety**
American National Standards Institute
Healthcare facilities shall implement policies and procedures to control surgical plume hazards. There is no suitable half-mask respirator to exclude all plume, therefore airborne contaminants shall be controlled by exhaust ventilation techniques as the first line of protection. (ANSI)
Safe Use of Lasers in Healthcare

British Occupational Hygiene Society for worker health protection (VOHS)
Surgical smoke represents a potential hazard to workers and should be evacuated and filtered.
Guidance Note 0906

Canadian Standards Association
Safety officers shall ensure that plume removal requirements are established, implemented and monitored for compliance. (CSA)
Surgical Plume Scavenging in Surgical, Diagnostic, Therapeutic & Aesthetic Settings

National Institute of Occupational Safety & Health (NIOSH, part of CDC)
NIOSH warns that plume contains both mutagenic and carcinogenic materials, and recommends evacuation and filtration of surgical smoke via general room and local exhaust ventilation, portable smoke evacuators and room suction systems.
Hazard Control Alert HC11: Control of Smoke from Laser/Electrosurgical Procedures

**Clinical Groups**
American Society for Laser Medicine & Surgery (ASLMS)
All medical personnel should consider vaporised tissue plume to be potentially hazardous both in terms of the particulate matter and infectivity. Evacuator suction systems should be used at all times.
Surgical Smoke Recommendation

**Association for Perioperative Practice UK**
Dedicated smoke evacuation machines must be used to evacuate smoke. (APP)
Standards & Recommendations for Safe Perioperative Practice

**Association of Perioperative Registered Nurses**
Exposure to smoke plume should be minimised through numerous measures, including use of PPE and smoke evacuators, with suction wand no greater than 2 inches from the source of smoke generation. (AORN)

**Australian College of Operating Room Nurses**
Personnel shall utilise appropriate equipment and procedures to prevent exposure; smoke capture devices shall be available for use during procedures. (ACORN)
Surgical Smoke Recommendation

**International Federation of Perioperative Nurses (IFPN)**
Employers should ensure policies are in place to reduce exposure, and that policies comply with workplace health and safety laws, legislative guidance and IEC standards. Practice guidelines include smoke evacuation and 0.1micron filtration-level face masks.
Guideline on Smoke Plume

**Norwegian Countries**
Laser and electrocoagulation smoke can contain insanitary substances and measures should be taken to eliminate such smoke.
Surgical Smoke Guidelines

**Occupational Safety & Health Administration**
Employers shall furnish employment free from recognised hazards likely to cause serious harm or death. This includes control of occupational diseases caused by breathing air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays or vapors. (OSHA)
General Duty Clause Blood Borne Pathogens Standard; PPE Standard

**Healthcare Quality**
ECRI Institute
The particulate matter of laser and ESU smoke is very similar, it is often overlooked as a hazard, and it is prudent to evacuate.
ECRI Health Devices: Laser Smoke Evacuators

The Joint Commission
Requires evidence that hospitals manage risks related to hazardous materials and waste, including gases and vapors from cautering equipment and lasers.
Environment of Care Standard

**Learn More**
For more information about Neptune E-SEP Smoke Evacuation Pencil and smoke evacuation, contact your Instruments sales representative
Clinical citations
3. International Federation of Perioperative Nurses (IFPN), Guideline on Smoke Plume, July 2007
5. National Institute of Occupational Safety & Health (NIOSH) NOISH Hazard Control Alert HC11: Control of Smoke from Laser/Electrosurgical Procedures (DHHS Publication #96-128), September 1996
8. Association for Perioperative Practice UK (APPP), Standards & Recommendations for Safe Perioperative Practice (Standard 2.6)
9. Australian College of Operating Room Nurses (ACORN), Standards/Surgical Plume, 2006
10. Operating Room Nurses Association of Canada (ORNAC); Recommended standards, guidelines and position statements for perioperative nursing practice, 2007
12. Canadian Standards Association (CSA), Surgical Plume Scavenging in Surgical, Diagnostic, Therapeutic & Aesthetic Settings (CSA Z305.13-09), January 2009
13. Nordic countries, Surgical Smoke Guidelines
14. Occupational Safety & Health Administration (OSHA), General Duty Clause (Public Law 91-596 Section 5); Blood Borne Pathogens Standard (29CFR 1910.1030); and PPE Standard (29 CFR 1910.134)
15. ECRI Institute, ECRI Health Devices: Laser Smoke Evacuators, 1990
18. K. Ball. AORN Annual Conference Presentation, “Management of Surgical Smoke in the Perioperative Setting”

A surgeon must always rely on his or her own professional clinical judgment when deciding whether to use a particular product when treating a particular patient. Stryker does not dispense medical advice and recommends that surgeons be trained in the use of any particular product before using it in surgery.

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