Standards for Perioperative Nursing in Australia

14th Edition
Surgical plume

Purpose
This Standard has been developed to give direction for managing surgical plume generated during clinical procedures when biological tissue is ablated or disrupted by means of energy-based devices such as electrosurgical (diathermy) equipment, radio frequency units, ultrasonic devices and lasers.

Background
Surgical plume contains smoke, tissue particles, carbon debris, hazardous chemicals, bacteria and viral particulates which are released into the environment and can be breathed in by unprotected personnel. Surgical plume presents a potential hazard to patients and health care personnel, similar to the risk presented by smoke from cigarettes.

Various chemicals emitted in the plume during tissue vapourisation are known to be carcinogenic. Viral DNA and intact cells have been recovered from surgical plume. Therefore, plume must be evacuated from the surgical site and not be allowed to become airborne. Surgical plume evacuation is viewed as a solution to the problem.

This Standard shall be used in conjunction with:
• ACORN standard ‘Electrosurgical equipment’
• ACORN standard ‘Laser safety’
• Standards Australia and New Zealand Standards AS/NZS 4173:2004 ‘Guide to the safe use of lasers in health care’
• Standards Australia and New Zealand Standards AS/NZS 4187:2003 ‘Cleaning, disinfecting, and sterilising re-usable medical and surgical instruments, and equipment and maintenance of associated environments in healthcare facilities’

Principle
Exposure to surgical plume is a workplace health and safety hazard and must be mitigated by methods appropriate to the procedure and instrumentation.

Standard statement 1
Personnel have a duty to use appropriate equipment and procedures to prevent exposure to surgical plume.

Rationale
Preventing airborne contaminants found in surgical plume from reaching the breathing zones of persons in the operating room or treatment room, by means of appropriate evacuation equipment, is the most effective means of controlling exposure to the hazards present.

Criteria
Personnel have a duty to:
1.1 use plume evacuation systems with ultra low penetrating air (ULPA) filters with efficiency rating of not less than 99.999 per cent
1.2 place in-line filters between the wall outlet and the suction canister to prevent contamination of the central vacuum system (wall suction)
1.3 make the decision to use wall suction with in-line filters based on a risk assessment to include volume of plume, duration of procedure and instrumentation
1.4 not use 0.1 micron filtration masks as first line of protection against exposure to surgical plume; however, these masks can be used as secondary protection.

Standard statement 2
Surgical plume shall be confined and contained at the time it is being generated.

Rationale
Eliminating surgical plume from the clinical environment as it is being generated will minimise staff exposure to this hazard. Plume should be eliminated by appropriate evacuation systems and capture devices and by following biohazard disposal practices.
Standard Surgical plume

Criteria

Personnel have a duty to:

2.1 position plume evacuation system in the operating theatre or treatment room for all procedures that will include the use of any energy-based device

2.2 test the equipment to ensure it is working properly and assemble required capture devices prior to beginning a clinical procedure

2.3 use capture devices (diathermy plume pencil, open tubing, instrument port, etc.) appropriate to the procedure and positioned as close as practicable without interfering with the proceduralists visual field. (Recommended not more than 2 cm from point of generation of plume/)

2.4 vent all surgical plume created during laparoscopy, or other minimally invasive surgical procedures, through a closed loop filtration system

2.4.1 that is either an active (powered) or a passive (not powered) system

2.5 use and change filters of a plume evacuation system in accordance with the manufacturer’s instruction

2.5.1 dispose of plume evacuation accessories and supplies (filters, tubing, connectors, adapters, etc.) in accordance with standard precautions policy and standards related to handling of blood-borne pathogens

3.3 provide personnel with appropriate education in the hazards of plume and the use of the plume evacuation equipment

3.4 assess the competence of personnel in the use of plume evacuation equipment

3.5 develop current policies and procedures to provide staff with guidance for limiting exposure to the hazard of surgical plume

3.5.1 align policies and procedures with occupational health and safety laws, health service organisation risk management, national and international standards, professional standards and guidelines, and infection control requirements

3.6 provide tools for risk assessment, training, competency validation

3.7 monitor compliance through a routine and periodic compliance audit process, designed to identify areas of deficiency, and provide recommendations to improve practice with regard to keeping the clinical workplace free of the hazards of surgical plume.

Recommendations

ACORN believes that patients and personnel must be protected from exposure to the hazards of surgical plume through the development of appropriate standards, facility policies and procedures and a quality assurance system to monitor compliance.

Approval statement

This Standard was authorised by the ACORN Board on 16 November 2012.


References


7. Steris Corporation. The hazards of surgical smoke: study guide #007.


15. Roark J. Dangers of surgical smoke still persist despite awareness campaign. ICT online access; 2006.


**Bibliography**

Association of periOperative Registered Nurses (AORN), Connecting the Dots: Surgical Plume – From Awareness to Action, Continuing Education Activity sponsored by Pfeider Enterprises, and Buffalo Filter, J Kneedler, P Smalley, March 2012.


Edwards BF, Reiman RE. Results of a survey on current surgical smoke control practices. AORN J 2006;87(4):739–49.


JCAHO. News release: agreement focuses on reducing exposure to biological and airborne hazards in healthcare. JCAHO; 2004.
Standard Surgical plume


Standards Australia/New Zealand Standards AS/NZS 4187:2003 Cleaning, disinfecting, and sterilising re-usable medical and surgical instruments, and equipment and maintenance of associated environments in healthcare facilities. Sydney: Standards Australia; 2003. [S].


