

Strategies to Improve Compliance With Smoke Safety

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ABSTRACT

Surgical smoke generated by energy-based devices is a recognized occupational hazard in ORs, containing toxic gases, particulate matter, and potentially viable cells. Exposure can lead to negative consequences. Research shows perioperative nurses are reporting twice the incidence of respiratory problems as compared to the general population. Despite increasing evidence of harm, evacuation of surgical smoke remains inconsistent across health care settings. Barriers to compliance include the lack of formal education on smoke hazards and evacuation equipment. Effective strategies to improve compliance with evacuation guidelines include conducting a gap analysis, creating and implementing an intervention plan, education and training on evacuation, and ensuring leadership support and participation. Other considerations to compliance involve the organizational culture, engaging perioperative nurses in changing practices, promoting legislation on smoke evacuation, and applying budgetary efficiencies. Addressing surgical smoke through evidence-based research and sustained compliance is essential to protecting the health and safety of perioperative personnel.

Key words: *surgical smoke management, compliance, perioperative safety, smoke evacuation, occupational exposure.*

In the 1990s, there were significant concerns by health care personnel regarding exposure to surgical smoke.¹ In 1996, AORN held its first multidisciplinary discussion on surgical smoke hazards.¹ A historic event including professionals from the Occupational Safety and Health Administration, the National Institute of Occupational Safety and Health, and ECRI; as well as scholars, surgeons, RNs, and health care manufacturers, met to discuss the hazards of surgical smoke exposure. Collaboratively, the experts gave a recommendation that surgical smoke generated by energy-based equipment should be evacuated and filtered.

Today, compliance with smoke evacuation guidelines and recommendations continues to be a challenge. This article provides perioperative leaders with practical strategies to improve compliance with smoke evacuation guidelines and promote a safer perioperative work environment.

BACKGROUND

Surgical smoke is commonly referred to as *plume*, *smoke*, *aerosols*, *bioaerosols*, *vapor*, and *air contamination*. When energy-based devices are used on tissue in surgery, surgical smoke produces offensive odors from gaseous by-products and contains ultrafine particles that result in visibility issues.²

Surgical smoke is made up of 95% water and 5% cellular fragments in the form of particulate matter.³ The 5% particulate matter is composed of blood, chemicals, tissue, viruses, and bacteria.³ The particles that remain in the air are less than 100 micrometers (µm) in diameter. Particles of 5.0 µm in size can reach the areas of the nose, pharynx, trachea, and bronchus if inhaled.⁴ Particles that are 2.0 µm or less are at the inspirable range and can reach the bronchioles and alveoli,⁴ which can lead to respiratory

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problems. The size of viruses ranges from 0.01 to 0.3 μm .⁵ A study in 1996 demonstrated that the smaller particles can travel farther according to particle size and weight and can affect people circulating the procedure, those scrubbed, and even remote staff outside the OR.⁶

Current practices often demand that evidence-based studies and research dictate policies, procedures, and guidelines on surgical smoke management. In 2012, a literature review was performed to highlight guidelines for best practices and to provide recommendations for practice changes.⁷ The literature search assessed the anatomy, physiology, and pathophysiology relating to the generation of surgical smoke and inhalation by the health care team. The conclusions of the review ascertained that smoke is a biological mixture of tissue by-products and chemicals. Risks to staff identified in this literature review and in responses to a survey included chronic respiratory irritation, transmission of infectious disease, and exposure to mutagenic by-products.^{7,8} Results reinforced that the efficacy of the standard surgical mask does not support protection, and that the use of engineering controls is required to evacuate surgical smoke effectively.⁷

A research study in 2013 used a high-level method to review the published literature on surgical smoke.⁹ A systematic review with various researchers initially identified more than 19 000 published articles on surgical smoke. The final review included 20 research studies that documented the contents of surgical smoke. This study concluded that potentially carcinogenic components of surgical smoke are small enough to reach the gas-exchange regions of the lungs, that surgical smoke contains infectious and malignant cells, and that the hazards of surgical smoke may have wide-reaching consequences.

In 2015, a study was completed summarizing the evidence of exposure to surgical smoke, outlining the risks associated with exposure, noting current evidence regarding protective equipment, and describing implications for nursing practice.¹⁰ The article presented a detailed synopsis of the evidence-based research studies from January 1990 to July 2011 and provided a more in-depth understanding of practice using a qualitative, quantitative, and mixed-method approach. A data aggregation process established the categories of the composition of smoke, probable effects, protective equipment, guidelines, practices, and attitudes of the staff. The results indicated that surgical smoke contains chemicals and biological tissue, such as

cells and viral particles, that are considered mutagenic, carcinogenic, and infectious. Staff compliance with using protective smoke evacuation devices is lower with electrosurgical equipment, suggesting a lackadaisical attitude toward electrosurgical smoke exposure.

Evidence-based studies addressing current practices can influence policies, procedures, and practices to control exposure to surgical smoke. Compliance with guidelines becomes the challenge to promoting standardization of smoke evacuation practices. A qualitative analysis was published in 2016 comparing the inconsistent use of smoke evacuation devices and the health care staff's rationale for not using the systems.¹¹ The study involved an inpatient surgical operating suite of 40 staff members and a survey with 12 questions addressing education, personal knowledge, and use of the equipment. The survey goal was to provide the reasoning behind noncompliance with policies and procedures. The survey results indicated that 97.5% of the staff were unaware of an existing smoke evacuation policy, that 2.5% had no concerns with exposure, and that 97.5% were concerned about their health from exposure to surgical smoke. Staff history showed that 95% had more than three years of OR experience, that 75% received no formal smoke evacuation training, and that 75% found the equipment cumbersome.

In 2022, the findings from a mixed-methods exploratory study using qualitative descriptive and quantitative explanatory approaches were published, confirming the symptoms and conditions associated with surgical smoke exposure.¹² A web-based survey format was used to identify perioperative nurses' reported symptoms and conditions from exposure to surgical smoke. The results indicated that nurses continued to report the same symptoms and conditions that had been described 10 years prior, and that nurses in surgery reported twice the incidence of respiratory problems compared with the general population. The top two reported conditions were nasal congestion and headaches. Some of the other significant findings reported were that existing conditions were exacerbated when a nurse was exposed to surgical smoke, and that education on surgical smoke hazards and knowledge of AORN's "Guideline on surgical smoke safety" helped to promote compliance with smoke evacuation. Perioperative practices are guided by comprehensive and compelling evidence from surgical smoke exposure so that appropriate smoke evacuation can be employed to minimize negative consequences.

A knowledge map study analyzed 363 journal articles on surgical smoke research and reviews from 2003 to 2022 to note any trends.¹³ Surgical smoke research grew slowly but steadily between 2003 and 2019, with a sharp surge in 2020 due to the COVID-19 pandemic and viral transmission via aerosols. The study concluded that surgical smoke research is now drawing the attention of scholars worldwide. Even though the United States, Italy, and China currently serve as the major contributors to this topic, more intense international cooperation is anticipated in the future.

Today's challenge is to standardize smoke evacuation practices so that clean air is provided in surgical environments that use energy-based devices. Surgical smoke exposure has been highlighted as a major workplace safety issue in the OR for years. An understanding of the negative consequences of surgical smoke exposure, having access to proper smoke evacuation equipment, and enforcing the use of guidelines for smoke evacuation management are some of the solutions that can reduce exposure for the clinical team.

SOLUTIONS

Surgical smoke evacuation recommendations are based on evidence from research designed to mitigate the well-documented hazards associated with surgical smoke generated during procedures using energy-based devices. A substantial and growing body of research demonstrates that surgical smoke contains toxic gases, viable biological material, and ultrafine particulate matter that pose respiratory and infectious risks to perioperative personnel and patients.¹⁴ Evidence-based guidelines from professional organizations, such as AORN, and regulatory agencies consistently recommend the use of effective smoke evacuation systems at the point of generation to reduce exposure.¹⁵ Solutions to promote smoke evacuation include conducting a gap analysis, developing an intervention plan, providing education and training, and ensuring leadership support. Implementing these solutions should improve air quality in the OR, enhance staff safety, support regulatory compliance, and promote a healthier surgical environment without disrupting workflow.

Gap Analysis

The first action in determining the need to manage surgical smoke is conducting a gap analysis. A gap analysis is a

strategic tool to assess current practices and then compare them to the future desired practice of evacuating surgical smoke. This process will help identify any remaining gaps and ascertain when the practice of smoke evacuation has been fully implemented for all procedures. When the gaps are identified, specific skills, resources, attitudes, or processes can be highlighted in an intervention plan that bridges those gaps. For example, a practice gap may show that education on the negative consequences of surgical smoke exposure is lacking. An education intervention can provide needed learning pertinent to the different roles in the OR. Actions can be prioritized so that all goals can be met when the practice gaps are identified.

An effective smoke evacuation program includes the commitment of the entire health care team to optimal practice to protect staff from the potentially harmful effects of surgical smoke.

An important component of the gap analysis can focus on specialty practices to provide a comprehensive view of where changes are needed. A gap analysis can determine deficits in specialty practices and levels of education as well as differences in staff member attitudes, and can magnify the need to implement a change. It also provides comparisons to validate compliance. The main goal of a gap analysis is to identify barriers to creating an occupationally safe practice environment. The expectations are that practices and attitudes can be influenced in the perioperative setting so that workplace and patient safety can be achieved. The gap analysis will highlight those areas needing attention so that smoke evacuation practices can be implemented.

Intervention Plan

An effective smoke evacuation program includes the commitment of the entire health care team to optimal practice to protect staff from the potentially harmful effects of surgical smoke. The entire team consists of anesthesia professionals, perioperative staff, surgeons, and administration.

The results of a gap analysis will provide guidance for setting up an intervention plan to evacuate surgical smoke.

This process involves thorough planning, implementation, dissemination, and reporting. The evaluation of the plan determines whether the implementation phase has demonstrated the effectiveness of the measures employed by the target population to remove surgical smoke. Assessing the progress of compliance with surgical smoke evacuation is compared to the outcome objective that was set to be achieved.

There are many formats an intervention plan can follow when practice changes are required. The nursing process offers a structured and consistent framework for implementing practice changes in intervention plans. These steps include assessment, diagnosis, outcomes/planning, implementation, and evaluation.¹⁶ Another format that an intervention plan can follow involves the familiar PDCA (plan, do, check, act) framework, a four-step management process to evaluate and monitor improvements in practices and procedural steps.¹⁷ Monitoring smoke evacuation in this format includes observing smoke evacuation device hook-up and appropriate evacuation techniques. Monitoring will measure practice and process changes based on the smoke evacuation policy. The smoke evacuation policy should reflect prioritizing the use of a surgical smoke evacuation system with an ultralow particulate air (ULPA) filter and activated carbon filtration as the first line of defense. The policy should also state that respiratory protection, such as a fit-tested surgical N95 filtering facepiece respirator, be used as secondary protection when needed. Regular surgical masks are loose fitting and do not provide respiratory protection. Monitoring also measures practice changes noting whether the team is compliant with evacuation for each surgical procedure that produces surgical smoke. The art of implementing new practices allows the surgical team members to explore knowledge and research, convey their ideas, and promote a safer workplace environment.

If a formal evidence-based practice (EBP) project is desired as an intervention plan is created, a PICOT (population, intervention, comparison, outcome, timing) question can be used to structure the research question and literature search to identify if there is already an answer to that question in preparation for an EBP project or if research is needed to answer the question.¹⁸ The PICOT question could be as follows:

- For OR staff and surgeons exposed to surgical plume, does implementing education on surgical smoke hazards

compared to not implementing education affect compliance with smoke evacuation within three months?

The results of the EBP project will highlight the effect of a structured educational intervention about surgical smoke evacuation. The intervention plan can focus on key indicators of compliance, such as education on the hazards of smoke exposure, that need to be included in the plan.

The goal of an intervention plan is compliance with needed practice changes to evacuate surgical smoke, mostly through the use of engineering controls (ie, using a smoke evacuator). By addressing the key indicators to promote compliance and providing proper education, a practice change can be accomplished. The intervention plan provides a comprehensive process to increase compliance through education and practice changes.

Education and Training

Comprehensive education of the perioperative team regarding the hazards of surgical smoke is the primary gauge for the successful execution of practice transformation. The participation of the entire team in the education is crucial to effect change. The health care team should be involved in purchasing decisions regarding evacuation equipment and supplies to incorporate smoke evacuation practices in different surgery services. A smooth transition in practice changes can be accomplished with shared accountability and an organized intervention plan. A preliminary assessment of the surgical team will establish baseline knowledge about surgical smoke. The results will inform comprehensive education for the entire surgical team on potential hazards, applicable standards and regulations, the various types of personal protective equipment needed, and the proper use of smoke evacuation equipment and devices. A posttest will determine if practice changes have been achieved. Evidence-based resource materials available in all physician lounges help to educate and convince surgeons of the need to evacuate surgical smoke.

The surgical team must have a comprehensive understanding of basic protective devices, such as the surgical mask, which is fluid resistant and can protect against splashes, sprays, and large droplets, but does not protect against airborne contamination. Surgical masks provide variable filtration efficiency and offer limited protection against small aerosolized particles, particularly those less than 5 μm .¹⁹

Seventy-seven percent of the particulate matter generated in surgical smoke is 1.1 μm or smaller.²⁰ Various types of respiratory masks, including surgical masks, N95 surgical mask respirators, and N100 filtering facepiece respirators, were analyzed by Gao et al²¹ in a simulated workplace protection factor study; the researchers noted that surgical masks do not provide quantifiable protection to filter surgical smoke. The N95 surgical mask respirators provided improved protection, while the N100 filtering facepiece respirators offered even better performance.²¹ Although higher filtration masks and respirators may capture some airborne particles, respiratory protection should be used as secondary protection in addition to effective smoke evacuation and filtration.

Education should clearly define which evacuation method is appropriate for the amount of surgical smoke produced. Operating room wall suction has been used as the primary means of evacuation to remove surgical smoke.¹⁴ The movement of air by wall suction is measured in cubic feet per minute (CFM) and ranges from 2 to 5 CFM.²² Wall suction is efficient for small amounts of smoke when an inline filter of 0.1 μm is connected, but the CFM may not adequately remove the contaminants because of the lower CFM flow rate.

The surgical team will need to address the multiple levels of learning and years of experience of the OR staff and physicians to implement a practice change.

Smoke evacuation systems are the most efficient and widely used method for smoke removal. The movement of air for smoke evacuators is usually from 30 to 50 CFM, which adequately captures surgical smoke.²² Smoke evacuation systems are commonly composed of triple filters, including a moisture filter, an ULPA filter, and a carbon filter. Moisture filters remove any moisture present in the surgical smoke. An ULPA filter is made up of a depth material that can capture the most penetrating particles, which are 0.12 μm in size, at an effectiveness of 99.999%.²³ This efficiency only allows one in one million particles to escape capture. The amount of smoke and particulates generated without a smoke evacuator can reach levels of 60 000 particles per cubic foot to approximately one million particles per cubic

foot within five minutes when using electrosurgery.²⁴ The charcoal filter works through adsorption to purify the air by trapping the toxic gases and gaseous byproducts, thus decreasing the odor.²²

Education regarding the actual hazards of surgical smoke is helpful in encouraging the surgical team to adopt safety guidelines and change practices. In her novice to expert theory, Patricia Benner assumes that skills acquired over time are through education and clinical experience.²⁵ The theory focuses on intuitive development, contextual nursing knowledge, and expert clinical practice.²⁵ Benner's evolved method of learning can be applied to the perioperative experience, knowledge gained, and responses to various situations in surgery. The surgical team will need to address the multiple levels of learning and years of experience of the OR staff and physicians to implement a practice change. Each team member brings their own preconceived understanding of the hazards of smoke, which can directly affect the adaptation of evacuation protocols and compliance with research-based guidelines.

Many OR personnel have not adopted the removal of surgical smoke because it was not perceived as a safety issue.²⁶ By providing education on the hazards of surgical smoke, emphasizing the negative consequences of exposure to surgical smoke, demonstrating how surgical smoke can easily be removed, and promoting the use of surgical smoke evacuators, personnel can be guided to promote workplace safety through proper smoke evacuation. Placing a high degree of value on evacuating surgical smoke and involving all members of the health care team to change practices will create a common goal of achieving smoke-free operating and procedural rooms. The use of compelling research and evidence for surgical smoke management along with persuasive stories from surgeons, nurses, and technologists on the negative consequences of surgical smoke exposure may help increase compliance with surgical smoke evacuation.

There may be factors that influence the outcome of implementing surgical smoke evacuation that are not part of the planned practice change. For example, there could be personnel who have not attended the education sessions on surgical smoke hazards who may still be part of the analysis of compliance monitoring. Extraneous variables should be identified and managed during implementation to prevent them from affecting outcomes.

Practice standards and guidelines are the foundation for education to ensure compliance because they are the proven consensus benchmarks for safe and customary practice. Changing practices encourages the surgical team to participate in education programs to understand the complexities of surgical smoke evacuation and then work in unison to adopt practices based on evidence and research.

Leadership Support

A governance committee that includes leaders and staff members from the health care facility is critical when surgical practice changes are needed, especially when a safety concern has been identified. Improving safety involves administration and surgical team members to initiate and implement intervention plans. This teamwork can enhance the commitment and accountability to the practice change needed that will provide a safe, smoke-free surgical environment.

Surgical team members, surgeons, anesthesia professionals, risk management personnel, and others can serve on the facility's surgical governance committee or leadership team. This leadership team makes sure that a policy is in place and communicated to all who manage surgical smoke. Specific procedures and practices are developed that address specific concerns according to service line. When the policy is introduced to all surgical team members and physicians, special attention is needed to ensure everyone has acknowledged and understands the policy. An implementation date should be determined so that everyone can anticipate when the policy will take effect and be enforced. After introducing the policy, monthly compliance monitoring should be performed to determine if the goal of a 100% smoke-free surgical environment has been achieved. The surgical leadership team can help facilitate policy and practice changes by noting noncompliance and addressing specific questions to help meet the facility's strategic goal of a smoke-free workplace.

Using a shared governance approach that involves both staff and physicians is a proven way to encourage teamwork, fairness, responsibility, and a sense of ownership among those participating in a staff-driven intervention. Including the surgical team and physicians in the selection of the equipment, products, and compliance with smoke evacuation practices will also enhance participation in the practice change.

CONSIDERATIONS

Effective surgical smoke management requires consideration of not only an organized intervention plan but also the factors that may influence compliance, which include organizational culture, perioperative nurses' degree of engagement, legislation, and organizational budget. Addressing these human and organizational factors alongside technology advancements helps create sustainable smoke evacuation practices that protect health and promote a culture of safety.

Organizational Culture

Organizational culture, including leadership support, staff beliefs, and shared accountability, strongly influence consistent smoke evacuation practices and help promote a culture of safety. Effective surgical smoke practices rely on targeted education, clear policies, collaboration across disciplines, and regular compliance checks.

Health care personnel can assess surgical smoke hazards and confirm the need for evacuation by evaluating the

- occupational duties where staff are at risk for surgical smoke exposure,
- type and number of surgical procedures that generate smoke,
- number of surgical procedures for which smoke evacuation is not performed,
- types of heat-generating equipment used, and
- availability of smoke evacuation equipment.

These assessments can also be part of the gap analysis when determining the shortfalls in practice. The findings can be used to encourage noncompliant surgeons and surgical team members to follow accepted policies and procedures.

Perioperative Nurses' Degree of Engagement

The nurse can be an innovator by acting as an agent to implement change. Perioperative nurses play a key role in patient and staff advocacy by reinforcing safety standards, educating team members, ensuring appropriate equipment is available, and integrating smoke evacuation into preoperative workflows. An intervention plan to ensure appropriate smoke evacuation incorporates a change

in policy and implements technology to increase safety for all OR personnel exposed to surgical smoke. Perioperative nurses should involve the entire staff and help them understand their roles by providing them with the tools and knowledge to support the practice change. Appropriate implementation and encouragement of smoke evacuation practices will reduce resistance, help with acceptance, and minimize barriers.

Perioperative nurses should realize that some physicians may resist the change to evacuating smoke more than the staff. The nurse needs to communicate the reasons for the change, the evidence supporting the practice, and the compliance monitoring needed to identify if best practices are being followed. Effective change management helps the surgical team handle resistance from staff and physicians. Identifying the barriers to the practice change allows perioperative nurses to focus on solutions to remove obstacles. Also, addressing specific practice gaps will allow the nurses to ascertain which component of the process or personnel attitude needs changing.

The Role of Legislation

The effect of state legislation regarding surgical smoke management in the United States has gained a lot of attention and popularity over the past decade. Perioperative nurses have been the major force behind this movement by telling powerful and memorable stories about their experiences with surgical smoke and the negative consequences of exposure. Legislation that mandates evacuation of smoke is now law in 21 states, with more states likely to pass legislation in the near future.²⁷ Other states hopefully will follow to promote clean air in the OR.

For practice changes in surgery to be successful, creating a culture of improvement, engagement, advocacy, and shared accountability is necessary. Interprofessional collaboration creates a supportive environment and builds stronger relationships and communication between physicians and nurses. Physicians and surgical team members advocate for proper smoke evacuation and educate legislators by sharing their stories about the negative effects of surgical smoke exposure. Perioperative nurses can influence lawmakers by linking their experiences, the health effects, and the effect on the surgical team with the grim consequences of being exposed to surgical smoke behind the closed doors of surgery.

Budgetary Needs

Attention to the budget is always part of the intervention plan when practice changes are implemented. The cost of items such as smoke evacuators, disposable tubing, filters, connectors, and smoke evacuation wands needs to be determined so that the monetary commitment for smoke evacuation devices and supplies for a procedure can be identified. Physician preference, storage requirements, ease of use, availability, compatibility, performance, reliability, and other factors should be addressed when selecting the tools and devices for smoke evacuation. Sometimes a manufacturer will place a smoke evacuator for free if a certain number of disposables are purchased each month.

Discussing the facility's needs with different industry representatives will help determine who will supply the smoke evacuation tools and the monetary amounts needed when forming a budget for smoke evacuation. Sometimes administration or the purchasing department may not understand the need for smoke evacuation expenditures. A review of the negative effects of surgical smoke exposure, state laws on surgical smoke management, research-based guidelines, and the health of the surgical team can quickly validate this need.

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Sustaining Change

Minimizing surgical smoke exposure continues to be a major challenge to ensure workplace safety. Compliance with smoke evacuation guidelines is influenced by knowledge, attitudes, organizational culture, and availability of equipment. A quality improvement project involving perioperative nurses showed that, despite awareness of hazards, compliance with smoke evacuation practices is often inconsistent, with barriers including surgeon resistance, workflow concerns, and equipment issues.²⁸ In another study, compliance with surgical smoke evacuation guidelines among perioperative nurses was suboptimal, and the authors emphasized the need for education, leadership

Key Takeaways

- ◆ Surgical smoke is a well-documented occupational hazard that contains toxic gases, particulate matter, and potentially viable biologic material. Research has linked exposure to respiratory symptoms and other health risks, yet compliance with smoke evacuation recommendations remains inconsistent across perioperative settings.
- ◆ Successful implementation of smoke evacuation begins with identifying practice gaps and developing a structured intervention plan to address them. Comprehensive education, competency development, and ongoing monitoring help the surgical team understand the risks of smoke exposure and adopt evidence-based safety practices.
- ◆ Effective smoke management relies on engineering controls, particularly smoke evacuation systems equipped with appropriate filtration technology. Respiratory protection may provide additional protection, but it should supplement rather than replace smoke evacuation at the point of generation.
- ◆ Long-term compliance depends on strong leadership, a culture of safety, multidisciplinary collaboration, and active engagement from perioperative nurses. Legislative requirements, policy enforcement, and sustained quality improvement efforts can help organizations achieve and maintain smoke-free surgical environments.

support, and policy enforcement to improve adherence.²⁹ An implementation-focused project demonstrated that a structured quality improvement initiative, including education, policy development, and monitoring, significantly improved compliance with smoke evacuation practices and helped move the organization toward a smoke-free OR environment.³⁰

Compliance with surgical smoke evacuation practices remains inconsistent across perioperative settings, largely because personnel often lack knowledge of the hazards of surgical smoke exposure and do not adhere to recommended evacuation guidelines.¹⁴ One study highlighted that compliance was significantly higher during laser procedures than electrosurgical procedures, despite electrosurgery producing more hazardous particulate matter.⁴ AORN emphasizes that compliance should be driven by clear policies, ongoing education, competency verification, and direct observation through quality assurance programs.¹⁵

AORN continues efforts to increase awareness about the hazards of surgical smoke by holding conference presentations on smoke and incorporating needed education and smoke evacuation measures into the recommended guidelines. Representatives from the American Society of Anesthesiology, American College of Surgeons, American

Nurses Association, and Joint Commission have been supportive of the efforts in promoting safety of the staff in relationship to surgical smoke exposure. Continued strong organizational leadership along with professional consensus can advance practices to protect staff from surgical smoke exposure. Agreement on the best approaches to effect change in smoke evacuation can have a positive influence on regulations and standards.

CONCLUSION

Organizations such as the Joint Commission, AORN, and the National Institute for Occupational Safety and Health are bringing significant attention to the dangers of surgical smoke by helping to inform leaders, surgeons, and staff while encouraging efforts to apply established safety guidelines that make surgical smoke evacuation a priority. Evidence-based guidelines and recommendations support that surgical smoke created by energy-based devices should be removed and surgical team members should be protected. Regulations have significant influence to stimulate change in practice, and a law regarding the mandatory evacuation of surgical smoke can definitively assist with changing practices. An intervention plan to specifically provide surgical smoke evacuation can be effectively implemented to create a safe workplace environment. An interdisciplinary team involving surgical team members,

surgeons, anesthesia professionals, administration, and occupational health and risk management personnel can facilitate the practice change to evacuate surgical smoke. The perioperative nurse is a major force to lead this challenging initiative to provide smoke-free surgical environments.

Ensuring consistent use of smoke evacuation systems, proper filter selection, and adherence to personal protective equipment requirements are essential components of compliance. Ultimately, sustained compliance depends on organizational commitment to a smoke-free environment, multidisciplinary collaboration, and continuous monitoring to identify barriers and reinforce best practices. After all, there is no such thing as safe surgical smoke!

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