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Four steps can reduce the risk of surgical fires

Control O₂, drapes, placement of electrodes

Of the more than 27 million outpatient surgeries performed each year, approximately 100 surgical fires occur, resulting in up to 20 serious injuries and one or two patient deaths annually, according to the Food and Drug Administration (FDA) and ECRI, a Plymouth Meeting, PA-based nonprofit health research firm.^{1,2,3}

"I believe that surgical fires are more common than the numbers indicate because near misses such as a tonsil sponge that catches on fire but is put out before any injury occurs is not considered a surgical fire by many people because the fire was easily put out," says **Vangie Dennis, RN, CNOR**, advanced technology coordinator in the surgical services support department at Promina Gwinnett Hospital System in Lawrenceville, GA.

The belief that surgical fires are underreported, along with the serious threat to patient safety that a surgical fire represents, were reasons that the Joint Commission on Accreditation of Healthcare Organizations has issued a sentinel event alert on surgical fires, says **Richard J. Croteau, MD**, executive director for strategic initiatives. (For information on how to access the alert, see **resource box, p. 92.**)

"While a surgical fire that results in a patient death or permanent loss of function is a reviewable sentinel event that should be reported to Joint Commission, our sentinel event system is a voluntary reporting system," he says.

Near-miss events that do not result in death or injury are not reviewable by Joint Commission, but the agency encourages every organization to perform a root-cause analysis on each incident to determine how it happened and what can be done to prevent it from happening again, Croteau says.

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EXECUTIVE SUMMARY

An alert issued by the Joint Commission on Accreditation of Healthcare Organizations brings the potential risk of surgical fires to the forefront and recommends steps to minimize risk.

- Question the need for 100% O₂ during facial surgery.
- Wait until all flammable preps have dried before draping patient.
- Keep gauze and sponges wet when used with uncuffed tracheal tubes to minimize leakage of O₂.
- Keep electrodes and lasers away from patients or in standby mode when not in active use.

Analysis of case reports show that the most common ignition sources of surgical fires are electrosurgery (68%) and lasers (13%). The most common locations of surgical fires are in the airway (34%) and head or face (28%).³

Prevention of surgical fires requires a collaborative effort between nursing, surgeons, and anesthesiologists to develop protocols that minimize the risks, says Dennis. Her first electrosurgery and laser policies that address fire risks were developed almost 15 years ago, she says.

"It was a tough sell to surgeons to have them change some of their traditional ways because I had to prove that a fire in an airway could happen when none of them had ever seen one occur," she says.

After literature searches and reviews of FDA alerts, Dennis was able to convince surgeons of the need to approach electrosurgery and laser surgery in a different manner because they do carry a higher risk of fire.

"Our anesthesiologists have been extremely supportive of our efforts to reduce the risk of fire and developed their own, very aggressive practice guidelines specifically for head and neck procedures to eliminate factors that contribute to surgical fires," says Dennis. [To review a copy of Gwinnett Hospital System's laser, electrosurgery, and anesthesia guidelines, go to www.same-daysurgery.com and click on the "toolbox." Your subscriber number on your mailing label is your user name. Your password is sds (lowercase) plus your subscriber number (no spaces).]

Some of the steps recommended by ECRI, many of which have been incorporated into Gwinnett Hospital System's policies, include:

- **Question the need for 100% O₂ during facial surgery; as a general policy, use air or FiO₂ at 30% or less for open delivery.**

"Our anesthesiologists primarily use compressed air or straight air to maintain patients oxygen levels and only use a level of O₂ needed to maintain the patient's SAO₂ at 92% at a minimum," says Dennis.

Her policy currently calls for a maximum FiO₂ at 40% at this time, but she is planning to reevaluate this policy in light of ECRI's recommendations, she adds.

- **Do not drape the patient until all flammable preps have fully dried.**

"Another safety step we take is to use drapes that allow us some reaction time if a fire should occur," says Dennis. She purchases Kimberly Clark (Roswell, GA) drapes that melt away if they ignite as opposed to producing a flash fire.

"Although there is a potential for second- or third-degree burns to the patient, this is less dangerous than the potential injuries from a flash fire," Dennis adds.

- **Keep sponges wet during oropharyngeal surgery.**

"The policy that our surgeons found most irritating 15 years ago was the one that prohibits dry sponges in the area of any laser or electrosurgery equipment," says Dennis. While surgeons insisted that wet sponges would not control bleeding, Dennis and her staff explained that they could use dry sponges if the electrosurgery equipment was not in the area, but they had to replace them with wet sponges while operating.

"We explained that if a flash fire occurred in the airway, it was far more serious than some bleeding," she adds.

- **Place electrosurgery electrodes in a holster or away from the patient and lasers in standby mode when not in active use.**

"Electrosurgery electrodes stay hot for a short time after they are shut off, so we make sure they are never near a drape," Dennis points out. "We also don't allow metal clamps to be used to hold electrosurgical equipment because the metal can conduct any heat or electrical current that could trigger a fire."

Another change in anesthesiology practice that improves patient safety is the elimination of nitrous oxide in any cases in which O₂ is used, says Dennis. "Nitrous oxide is flammable when in the presence of O₂, so it cannot be used for induction in tonsillectomies," she says.

While cuffed endotracheal tubes are preferred because they minimize any leaking of O₂, one exception is tonsillectomy in a young child in which an uncuffed endotracheal tube must be

used, points out Dennis. "In these cases, nitrous oxide may be used to induce the patient; then it is turned off, and the O₂ is raised," she explains.

Dennis also recommends that every policy include a description of how to manage the treatment of a patient during and after a surgical fire.

"Although surgical fires are not a common occurrence, there are few other incidents that can happen during surgery that can be as life-threatening and devastating to a patient," she says. "We need to make sure that anesthesiologists, surgeons, and nurses work together to minimize any risk of fire during surgery."

SOURCES AND RESOURCES

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ECRI offers a clinical web site that includes published articles and educational posters on surgical fires that are free. Go to www.mdsr.ecri.org/ and enter "fires" into the Search Terms line.

To read the sentinel alert regarding surgical fires, go to www.jcaho.org. Under "Latest Newsletters," click on "Sentinel Event Alert — Issue 29."

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2. Hall MJ, Lawrence L. *Ambulatory surgery in the United States, 1996*. Advance data from vital and health statistics. Hyattsville, MD: National Center for Health Statistics; 1998.
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