The Nebraska State Fire Marshal wrote the state’s hospitals and ambulatory surgery centers (ASCs) March 31 saying they may not use alcohol-based surgical prep solutions when cautery or electrosurgery is planned.

Though the ruling applied to Nebraska, the Centers for Medicare and Medicaid Services (CMS) agreed with the ban, meaning it could spread to other jurisdictions. If that happens, experts worry about the risk for surgical infections.

Health care organizations, led by the American Society for Healthcare Engineering (ASHE), are working to address the situation. ASHE submitted a proposal to the National Fire Protection Association (NFPA) in April asking it to amend NFPA 99, the fire code for health care facilities.

In the meantime, ASHE advised hospitals and ASCs to discuss the issue with their patient safety leaders and decide how to respond if cited by CMS.

The fire marshal’s letter stemmed from a surgical fire at a hospital in Omaha, in which a woman was severely burned.

“We found they were using a flammable germicide during surgery, and that is apparently what caused the fire,” the assistant state fire marshal, Bruce Neemann, told OR Manager. The patient later died, though it is not clear she died of fire-related injuries, he said.

In the letter, the fire marshal said use of flammable germicides (such as alcohol-based prep solutions) in conjunction with cautery and electrosurgery violates NFPA 99 13.4.1.2.2 (2003 edition), which states: “Liquid germicides used in anesthetizing locations, whenever the use of cautery or electrosurgery is contemplated, shall be nonflammable.”

The letter says the fire marshal conferred with regional and national CMS offices, and CMS officials concurred with the ruling, which applies to any “flammable liquid germicide” such as DuraPrep, Prevail, and alcohol. A spokesman at CMS headquarters in Baltimore confirmed that.

ASHE is not aware of facilities outside Nebraska that have been cited by CMS for use of alcohol-based prep solutions.

What should OR managers do?

ASHE advises managers to carefully review their practice for surgical prepping. If they continue to use alcohol-based preps, they should strictly adhere to the product labeling, says Dale Woodin, ASHE deputy executive director. That includes making sure the solution is thoroughly dry and not allowing it to pool.

Managers should also review ASHE’s proposal to NFPA, termed a technical interim amendment (TIA). The TIA outlines how flammable germicides and antiseptics can be used safely and gives a rationale for use of alcohol-based surgical preps. The TIA is posted at www.ashe.org.

If cited by CMS, a facility can file an application for a waiver, Woodin notes. An application can be filed if a facility believes complying with a rule would be a financial hardship or have “unintended consequences.” In its application, a facility could use the rationale in the TIA to explain why it believes continued use of alcohol-based preps is justified and how the facility intends to manage the fire risk.

Amending NFPA 99 is a long process. If NFPA approves the amendment, it then must be considered by CMS, which could take months.

A time-out for preps

One recommendation in the TIA is to have a time-out before any surgical procedure that uses flammable solutions to:
• verify the site is dry before it is draped and an ignition source is used
• make sure pooling has not occurred or has been corrected
• remove any solution-soaked materials from the OR.

The time-out would be similar to that required by the Joint Commission on Accreditation of Healthcare Organiza-tions for surgical site verification.

Other recommendations in the TIA include:
• applying an alcohol-based skin prep from a unit-dose type container
• emphasizing the need for dry time before a heat source is used
• recommending a periodic hazard assessment of surgical procedures and the OR environment.

Worries about surgical infection

Experts were concerned about implications for surgical infection if alcohol-based surgical preps are banned. The skin is the most important source of organisms that contaminate surgical wounds. An estimated 500,000 surgical site infections occur annually. There are about 50 to 100 surgical fires each year, with 1 to 2 fatalities, according to ECRI, a nonprofit organization that researches health care technology.

As the TIA explains, alcohol is the “gold standard” prep for preventing surgical site infection because it kills microorganisms quickly. Aqueous solutions without alcohol take much longer to dry, and even with aqueous formulations, alcohol is used during skin cleaning.

No studies have adequately compared the most common skin prep agents (povidone-iodine, alcohol-containing products, and chlorhexidine gluconate), the Centers for Disease Control and Prevention notes in its Guideline for Prevention of Surgical Site Infection 1999.

Complete removal of alcohol would “constitute an unacceptable risk for increase surgical site infection and has never been attempted,” ASHE points out in the TIA.

Telling ORs to remove alcohol-based preps essentially amounts to “conducting an uncontrolled clinical trial under fiat,” maintains Judene Bartley, MS, MPH, CIC, who has worked on the issue with ASHE on behalf of the Association for Professionals in Infection Control and Epidemiology, Inc (APIC).

Al de Richemond, a veteran surgical fire investigator with ECRI, in an interview with OR Manager said, “Alcohol has associated dangers, as do all flammable anti-septics and medications, most of which are permitted in surgery.” He also noted that alcohol-based preps aren’t prohibited by NFPA 99 when lasers are used, even though they also are an ignition source. For that reason, he says, the logic of citing facilities for use of flammable preps with electrosurgery “is flawed.”

Alcohol is involved in perhaps 10% to 15% of surgical fires in the US, ECRI estimates. Such fires typically happen when an alcohol-based prep solution is used improperly—is not allowed to dry or pools under the patient. Vapors can accumulate under the drapes and drift to the surgical site, where they can be ignited by an electrosurgical electrode.

De Richemond described a 2002 case in New Zealand that led to a similar call for a ban. The fire happened after a woman needing an emergency cesarean section was prepped with a large amount of alcohol, which ignited when electrosurgery was applied. She received third-degree burns to 11% to 12% of her body; the baby was not harmed. Instead of a ban, New Zealand authorities issued a safety alert on proper use of prep solutions (Tooher R, et al. Aust New Zealand J Surg. 2004;74:382-383).

The State of Texas also has issued a position statement on use of alcohol-based surgical preps. Even though the state’s hospital licensing rules say flammable germicides shall not be used as preps, the state health department said it recognizes the efficacy of alcohol-based preps in preventing surgical infections. Until the rule can be revised, the state said that facilities should not be cited for a violation if they meet a series of conditions for proper use of the preps. The position statement applies only in Texas.
**Fast facts**

**Surgical fires**
- 50 to 100 surgical fires occur each year, with 1 to 2 fatalities.
- An estimated 10% to 15% of surgical fires in the US involve alcohol-based prep solutions.

—ECRI

**Surgical infections**
- About 500,000 surgical site infections (SSIs) occur annually in the US.
- Surgical infections are developed by:
  - 2% to 5% of patients having clean extra-abdominal operations
  - up to 20% of patients having intra-abdominal operations.
- Compared to patients without an SSI, patients who develop SSIs are:
  - up to 5 times more likely to be admitted to an intensive care unit
  - 5 times more likely to be readmitted to the hospital
  - up to 2 times more likely to die.

—Bratzler D W, Houck P M.

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**What should OR managers do?**

Here are some steps to take on use of alcohol-based surgical prep solutions:
- Read the proposed amendments to NFPA 99 (the TIA) from the American Society for Healthcare Engineering (www.ashe.org).
- Discuss safe use of alcohol-based surgical prep solutions as part of your facility’s patient safety process.
- If you continue to use alcohol-based preps in procedures involving cautery or electrosurgery, adhere strictly to the product directions.
- If your facility is cited by CMS for a violation of NFPA 99 because of use of alcohol-based surgical preps, consider filing an application for a waiver. The application comes with the citation notice.