Do you know what temperatures the blanket and solution warming cabinets are set for in your OR? Is your staff aware that an IV bag or cotton blanket that may not feel overly hot to their touch can burn a patient if left on long enough?

ECRI, a nonprofit organization that researches health services and technology, has investigated and consulted on many incidents in which surgical patients have been burned because warmed blankets or solutions were too hot.

These burns usually occur in patients who are unconscious or have been given regional anesthesia and are insensate to temperature. Most incidents involve IV bags or irrigation solution bags heated to unsafe temperatures and used as positioners during surgery. Other incidents involve overheated solutions used for surgical irrigation that caused severe internal injury. Overly hot blankets folded in layers also have caused burns when placed on or under patients.

In a recent Hazard Report, ECRI recommends limiting the temperature of blanket and solution warming cabinets to 110° F (43°C), saying this will “greatly reduce the risk of burns yet allow sufficient warming of blankets and solutions.” The report also recommends alerting the staff to this burn hazard and establishing a process for maintaining and monitoring warming cabinet temperatures.

Investigating burns

Mark Bruley, ECRI’s vice president for accident and forensic investigation, told OR Manager that in the past 10 years he has conducted investigations in at least a half dozen hospitals where clusters of burn injuries were identified immediately after surgery. The investigations found the burns resulted from hot IV bags used as positioning aides or from very hot cotton blankets.

“IV bags are not meant to be used as positioners, even though everyone has done it at one time or another,” says Bruley.

Many clinicians believe blankets and solutions must be heated to high temperatures to keep the patient warm and comfortable, but that is not the case, he says.

Overheating IV bags and blankets is problematic for a couple of reasons, he says. First, IV fluid and irrigation solution bags are not sold as positioners, which makes that an off-label use. Also, if the bag leaked, it could deflate and cause the patient to move during a critical part of the procedure. This doesn’t happen when the patient is positioned with a rolled-up towel or a soft gel or foam form.

Also, it’s a common misconception that warmed blankets can warm a patient, Bruley says. Human physiology and the physics of heat transfer both work against a warmed cotton blanket being able to raise a patient’s core temperature. At best, a warmed blanket can help reduce heat loss and make the patient feel more comfortable, he says.

What is a safe temperature?

Burns happen because many staff members do not appreciate just how little heat it takes to cause a burn, Bruley notes. The likelihood of a contact skin burn depends on:

• the thermal conductivity and temperature of the material touching the skin
• how long the contact lasts
• condition of the skin (eg, how well perfused it is).

Burn risk increases exponentially with temperature, Bruley emphasizes.

Two studies of Navy volunteers in 1947 and 1959 established the time and temperatures that it takes to burn human skin. The experiments found a second degree burn can occur in:

What temperature is recommended for warming cabinets?

ECRI recommends that warming cabinet temperature settings be limited to 110° F (43°C).
• 2 seconds at 149°F
• 30 minutes at 115°F
• 3 hours at 112°F, which may not feel very hot to a nurse’s touch
• 6 hours at about 110°F.

Bruley says OR nurses have told him they want solutions in warming cabinets kept hot so they can take the bags into the OR at the beginning of the case, and the bags will still be warm enough when the surgeon requests them.

A better practice, he says, would be to leave the solution in the warmer, anticipate when it will be needed, and have the circulator get it at that time. Then the warmer could be kept at a lower temperature.

Recommendations for OR managers for warming cabinets and warmed solutions and blankets:
• Recognize the burn risk to unconscious patients and alert the staff to the risk. Temperatures that don’t feel hazardous to the nurse’s hand can burn an unconscious patient or a patient under regional anesthesia.
• Set the temperature of warming cabinets to 110°F (43°C) and ensure it cannot be changed.
• Collaborate with the engineering department to make sure the cabinet temperature settings are properly calibrated.
• Assign responsibility within the OR for monitoring cabinet temperatures and making sure temperatures are maintained at the correct level.

Who is monitoring the heating chambers?

Some warming cabinets have chambers that can be set up to 200°F. Chamber temperatures depend on the make and model of the cabinet and can vary from one section of the cabinet to another. Often, there isn’t much oversight of temperature calibration of temperatures in these chambers, says Bruley.

Though clinical engineering or facilities engineering departments might have warming cabinets in their equipment inventory, he says it is rare in his experience that the cabinets are checked to make sure they are operating according to design.

ECRI recommends making sure that engineering departments have the cabinets in their inventory and inspect them annually. Bruley also advises contacting suppliers of solutions for the recommended use and storage temperatures for their products.

At hospitals where he has investigated burns, Bruley has found cabinet settings were out of specification or set very high. When he told the OR staff they had to turn the temperatures down, they were initially concerned the solutions or blankets wouldn’t be warm enough. But once he explained the thermal issues and burn risk, the staff understood the problem. They turned the temperatures down, and there were no more burns.

—Judith M. Mathias, RN, MA

ECRI is a nonprofit health services research agency that focuses on health care technology, risk and quality management, and environmental management. For information, go to www.ecri.org or phone 610/825-6000.

References
