

not just a cold w

THE DANGERS OF HYPOTHERMIA IN



FIGURE 1 A hyper-hypothermia blanket can be placed over the patient, or between the patient and mattress.

Weather problem

SURGICAL PATIENTS

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HYPOTHERMIA, THE LOWERING OF THE BODY TEMPERATURE IS MOST COMMONLY ASSOCIATED WITH THE WINTER MONTHS AND IS OFTEN CONSIDERED TO BE A PROBLEM COMMON ONLY IN THE ELDERLY POPULATION. EVERY YEAR, UP TO 50,000 OLDER AMERICANS, MANY OVER THE AGE OF 80, ARE HOSPITALIZED WITH HYPOTHERMIA.² UNFORTUNATELY, ABOUT HALF OF THE ELDERLY WHO DEVELOP HYPOTHERMIA WILL DIE FROM IT.²

WITH INCREASING FREQUENCY, GERIATRIC PATIENTS ARE HAVING MAJOR SURGICAL PROCEDURES WITH LARGER INCISIONS. EXAMPLES OF THESE PROCEDURES INCLUDE: ABDOMINAL AORTIC ANEURYSMECTOMY, FEMORAL POPLITEAL BYPASS GRAFT, THORACOTOMY/PNEUMONECTOMY, BOWEL RESEC-

TION, CARDIAC SURGERY, TOTAL JOINT REPLACEMENT, AND RADICAL PROSTATECTOMY. IN ADDITION TO THE INHERENT RISKS FOR THE ELDERLY, THESE CASES REQUIRE THAT EXTENSIVE AREAS OF THE SKIN BE PREPPED FOR WIDE INCISIONS, PUTTING THE PATIENT AT RISK FOR INTRAOPERATIVE HYPOTHERMIA.

HOWEVER, HYPOTHERMIA CAN ADVERSELY AFFECT SURGICAL PATIENTS OF ANY AGE, AT ANY TIME. IT IS IMPORTANT FOR THE SURGICAL TEAM TO BE MINDFUL OF THE CAUSES OF HYPOTHERMIA, ITS PREVENTION, AND METHODS OF REVERSAL. THIS ARTICLE WILL DEFINE HYPOTHERMIA, IDENTIFY ITS RISK FACTORS, AND DISCUSS THE CARE PATHWAYS TO PREVENT AND REVERSE THE EFFECTS ON THE PATIENT.

Hypothermia defined

Hypothermia is an abnormal and dangerous condition in which the temperature of the body falls below 95°F (35°C).¹ It is usually caused by prolonged exposure to cold and/or damp conditions. Respirations are shallow, and the pulse is faint and slow.¹ People most susceptible to hypothermia include those who are very old or very young, those with cardiovascular problems, people who are hungry or tired, and people under the influence of alcohol. Hypothermia causes fatigue, weakness, poor coordination, lethargy, and drowsiness. If the body temperature sinks below 90°F (32.2°C), the heart, lungs, nerves, brain, and muscles gradually slow down.¹

Contributing factors

Age is one of the major contributing factors of hypothermia. In addition, general health, coexisting disease, and indications for surgery need to be considered as well. The elderly are at a higher risk for several reasons. Their regulatory systems, which generate and/or conserve body heat, may no longer be fine-tuned enough to cope with conditions that lead to hypothermia. Their decreased and/or atrophied muscle mass reduces their ability to shiver, which is a line of defense against hypothermia.² In addition, the nervous system in the elderly may be slower to prompt shivering when the temperature drops. Finally, older people are more susceptible to hypothermia because the protective layer of fat beneath the skin tends to thin with age, offering less insulation against the cold.

Illnesses can also make people more susceptible to hypothermia. Memory disorders, hypothyroidism, other hormonal disorders, strokes, and other conditions that induce paralysis and reduce mental capacity put patients at risk for hypothermia.³ Also, conditions that limit activity and conditions that curb normal blood flow put people at risk.³ Examples of these conditions include severe arthritis and Parkinson's disease. Plus, medications used to treat nausea, depression and anxiety, as well as some over-the-counter medications used to treat the common cold can also affect heat loss.³

In the operating room (OR), people of all ages are susceptible to hypothermia. In surgery, a large area of the skin is exposed preoperatively for skin preparation before draping and intraoperatively, when large incisions expose bodily tissue to room temperature, irrigating fluids, and other equipment used during surgery. In fact, room temperature may be the greatest factor in hypothermia. The standard range of temperature for the OR is 68°F (20°C) to 73°F (23°C).⁴ If the room temperature is kept low, and the patient is wearing little or nothing to help them maintain body heat, inevitably the patient's core temperature will decrease. Often temperature in the OR is decreased solely for the benefit or comfort of the surgical team; however, this directly opposes efforts to maintain a normothermic state for the patient. Researchers have estimated that between 60% and 90% of patients admitted to the postanesthesia care unit (PACU) are hypothermic.⁴

Another contributing factor to hypothermia in the surgical patient is the type of operation. The common surgical specialties in which patients are more susceptible to hypothermia are vascular, general, and orthopedic surgery.⁵ In these specialties, large areas of the body are commonly exposed for long periods of time. In some vascular procedures, the entire body is exposed for the duration of the surgery, an average of three hours.⁵ In general surgery, for instance bowel surgery, the abdominal cavity is open and exposed for an average of two hours, which lowers the body's core temperature. Ninety-four percent of patients undergoing laparoscopic surgery experience hypothermia caused by the irrigating fluids not being pre-warmed. The average operative time for orthopedic surgery is two hours.⁵ A cooler room temperature is often required for orthopedic surgery, especially during total joint replacement surgery, to prevent premature cement fixation.⁵

Finally, the type of anesthesia used in surgery can be a contributing factor for hypothermia. Body temperature is often ignored when a patient is under regional anesthetic, despite supporting evidence that hypothermia occurs regularly in

these procedures.⁷ A high-level spinal anesthesia and increasing age were risk factors in a study at Johns Hopkins Hospital.⁷ Spinal and epidural anesthetics produce motor block and vasodilation, which lead to heat loss. This heat loss has the potential to last postoperatively, if the block does as well.⁴ In both spinal and general anesthesia, advanced age is associated with increased risk for hypothermia.⁷ General anesthetics decrease basal metabolic rate and inhibit hypothalamic temperature regulation, resulting in vasodilation that brings warm blood to the surface and speeds heat loss.⁴ If muscle relaxants, such as succinylcholine and tubocurarine are used, the patient is unable to shiver to produce heat.⁴

Prevention

Hypothermia occurs more frequently in the OR during surgery than most personnel realize. Perhaps this is because the surgical team relies too heavily on anesthesia providers to prevent hypothermia instead of taking responsibility as a team. Another cause may be that hypothermia is so common and not believed to be a significant factor in a patient's well being or recovery. Yet, evidence suggests that surgical patients with hypothermia have increased instances of wound

infections, increased surgical bleeding, longer hospital stays, and increased risks of cardiac event, which is the most common cause of death following surgery.⁸

Monitoring the patient's temperature is vital to the prevention of hypothermia. This can be accomplished via esophageal, rectal, or temporal temperature probes. The anesthesia provider must continuously monitor and record the patient's temperature, which the entire surgical team can view on the monitors. Working together, the entire surgical team can prevent hypothermia from occurring. Often the patient's only recollection of surgery or the operating room is of the cold. At one time or another, most of the OR team has heard the patient say, "It is cold in here," when they arrive. The patient's passing comment is handled with a warm blanket that has too soon also become cold.

Maintaining proper room temperature is a major way of preventing hypothermia in the surgical patient. Because of various surgical specialty necessities previously discussed, the room temperature is lowered. This may not be a problem if warming devices are added to the patient in exchange for lowering of the room temperature. It is important to remember the AST motto



PHOTO Plasti-Pad® Plus reusable hyper-hypothermia blanket. © 2003 Cincinnati Sub-Zero Products, Inc.

FIGURE 2

One type of hyper-hypothermia blanket uses warmed water to help maintain the patient's body temperature.

FIGURE 3

Other styles of blankets use heated air to maintain body temperature.

a. Multi-Access



Blanket

b. Lower Body

Blanket

c. Surgical Access

Blanket

“aeger primo, the patient first.” The surgical team needs to find a balance between their comfort and the well being of the patient.

Technology and hypothermia management

Medical manufacturers have designed specific devices to decrease, increase and/or maintain body heat in the surgical patients. These are hyper-hypothermia blankets, foil blankets, heated air blankets, and fluid warmers. Hyper-hypothermia



blankets (used with foil blankets if possible) are a good defense against hypothermia. The hyper-hypothermia blankets are polyurethane or vinyl blankets with heated or cooled fluid circulating throughout. The fluid is warmed or cooled in a machine first, then distributed to the blanket for circulation. The hyper-hypothermia blanket and foil blankets are both nonsterile items, and are placed on the operating table preoperatively and can go either under the patient’s mattress or under the

patient directly, placing a sheet between the patient and the blanket (Figures 1 and 2). It is optimal to combine the use of a hyper-hypothermia blanket with foil blankets that go over the patient.

The foil blankets are just like camping blankets—shiny silver on one side and dull on the other. When placed on top of warm bath blankets over a patient, the foil blanket helps retain heat in coordination with the hyper-hypothermia blanket underneath the patient. The foil

PHOTO: Bair Hugger®. Photos are reproduced herein with permission. ©2003 Arizant Healthcare Inc, all rights reserved.

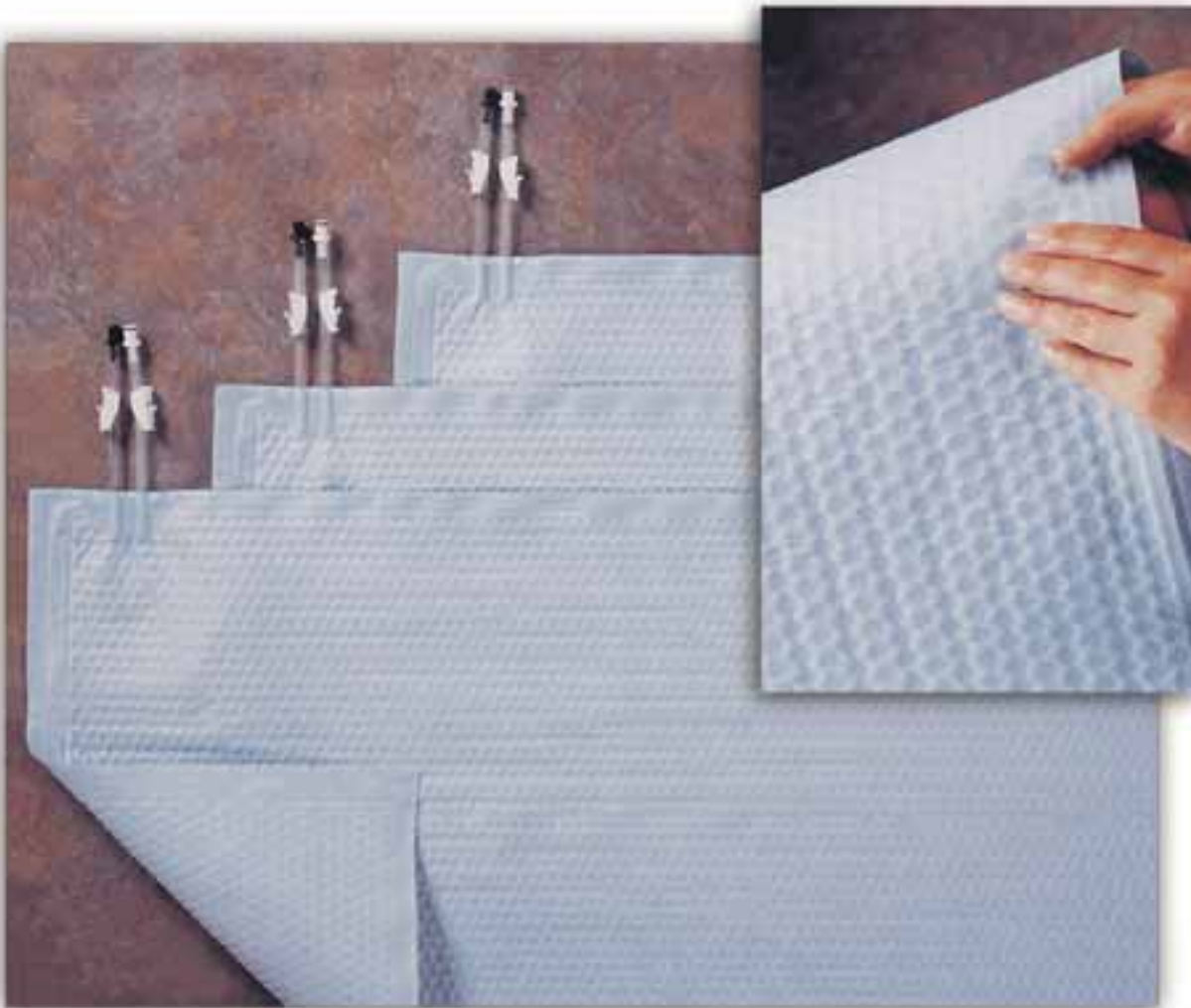


Photo: Maxi-Therm® Lite hyper-hypothermia blanket. © 2003 Cincinnati Sub-Zero Products, Inc.

FIGURE 4
Hyper-hypothermia blankets may vary in size for adult, pediatric or infant patients.

blankets trap the heat between the patient and the hyper-hypothermia blanket. Together, these are very effective in preventing hypothermia.

The Bair Hugger® system, made by Arizant Healthcare, is a popular system used in the OR to help maintain body temperature. A nonsterile paper/plastic drape, placed over the patient prior to draping, covers as much surface area as possible. The warming unit draws ambient air through a filter and warms the air to the specified temperature.⁹ It then delivers the warmed air through a hose to the Bair Hugger blanket.⁹ There are different sizes of blankets depending on the type of surgery being performed, (Figures 3a–c and 4).⁹ The combination of these three modalities together can increase the effectiveness of each to maintain the patient's normal temperature and prevent hypothermia.

The surgical technologist in the scrub role (STSR) is in a key position to prevent hypother-

mia. Warm fluids for irrigation are very important in preventing hypothermia. If cold or even room-temperature irrigation is used, the patient's temperature can drop rapidly. This is prevented with little effort on the part of the surgical team. Use of an irrigation warmer is a great way to prevent hypothermia from irrigation and can be used in both open and laparoscopic procedures. Fluid warmers are a closed irrigation system, reducing the risk of infection and cross contamination.¹⁰ During a case, the STSR can also wait to ask for irrigation fluid as the surgeon requests it, allowing the circulator to pour a bottle of warm saline that is being stored in a warmer.

Each one of these methods is effective in preventing hypothermia, but alone they may be not sufficient. Like the individual members of the surgical team, they become more effective when combined—the result being improved outcomes for patients.

Treating the problem

Patients can become hypothermic at any time. Key times at which to monitor the patient's temperature include: when large cavities or wounds are opened and exposed for long periods of time, and when the surgical drapes are removed. During these times, the patient's temperature can drop drastically due to exposure.

When the patient's temperature drops intraoperatively, the OR team can do several things to combat the situation. Using warm IV fluids will circulate warm fluid throughout the patient's body. Covering the patient with the Bair Hugger® is also effective. And, room temperature can be increased, provided it is not contradictory to the needs of the surgery.

When the drapes are removed at the end of the case, warm blankets need to be placed on the patient for the trip to the PACU. In the PACU, if the patient becomes or remains hypothermic, additional warm blankets or a Bair Hugger may be added. Warm IV fluids can be pushed and foil blankets utilized. If necessary, a hyper-hypothermia blanket can be placed beneath the patient.

Recovering from hypothermia

Patient complications and recovery depend on how low the body temperature falls. If it has not fallen below 90°F (32.2°C), the chance of total recovery with no damage to the patient is good.³ If the temperature falls between 90°F and 80°F (26.6°C), recovery is still possible, but some permanent damage is likely.³ If the body temperature drops below 80°F, most victims will not recover.³

Conclusion

News outlets often publicize stories of victims of hypothermia caused by outdoor/winter exposure, in the elderly population or related to those who cannot afford heat. Very rarely is hypothermia in the surgical patient publicized outside the hospital, even though it happens more often than it should. Prevention is simply the best cure.

Simple actions can prevent a patient from becoming hypothermic. With the advanced technology available to the surgical team today, hypothermia should rarely occur. Standard care

plans should be in place to prevent hypothermia, regardless of patient age, size, or operative procedure. Only through advanced perioperative efforts of the OR team are the risks of hypothermia in the surgical patient prevented. STSRs are in a key position to make a difference. Through knowledge and implementation of very basic measures, the OR team can prevent adverse affects of hypothermia. Quick action and attention to the patient's needs, particularly in the elderly, are evidence of "aeger primo" the patient first, the motto of the Association of Surgical Technologists.

About the author

Alison Lamontagne graduated from STCC and earned her CST in 2002. She currently scrubs at Bay State Medical Center in Springfield, MA.

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