

The Nurse Anesthetists' Adherence to Swedish National Recommendations to Maintain Normothermia in Patients During Surgery

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Purpose: *The aim of this study was to determine if nurse anesthetists (NAs) have access, knowledge, and adhere to recommended guidelines to maintain normal body temperature during the perioperative period.*

Design: *A descriptive survey design.*

Methods: *Questionnaires were sent to heads of the department (n = 56) and NAs in the operating departments in Sweden.*

Finding: *The level of access to the recommendations is high, but only one third of the operating departments have included the recommendations in their own local guidelines. The NAs' adherence was low, between 5% and 67%, and their knowledge levels were 57% to 60%.*

Conclusions: *A high level of knowledge, access, and adherence are important for the organization of operating departments to prevent barriers against implementation of new recommendations or guidelines. There are needs for education about patients' heat loss due to redistribution and clear recommendations.*

Keywords: *adherence, nurse anesthetist, perioperative hypothermia, recommendations.*

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MILD PERIOPERATIVE HYPOTHERMIA occurs when body temperature falls below 36°C¹⁻⁴ and can often happen during the perioperative period. Between 46% and 77% of patients undergoing surgery develop mild hypothermia.^{2,5,6} There are generally four

contributory factors to patients' heat loss: radiation, convection, conduction, and evaporation. However, for both regional and general anesthesia, there is a fifth factor—redistribution.^{7,8} This accounts for 87% of patients' heat loss during the first 30 minutes of

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anesthesia.⁹ This fifth factor originates from the effects of the anesthetic drugs, leading to vasodilatation of the blood vessels and blood flow increases. When blood from the warm body's internal core temperature, which is usually 2°C to 4°C higher, reaches the peripheral cold skin, the blood temperature decreases.^{9,10} When the chilled blood returns, the core temperature has been lowered approximately 1°C within 30 minutes.⁹ Consequences of mild hypothermia could be a risk for poor coagulability, toxic reaction to drugs, increased mortality, pressure ulcers, increased need for blood transfusion, shivering, postoperative wound infections, longer hospital stay, and experiences of discomfort.^{4,11-14}

The key to prevent hypothermia is to maintain the patients' normal body temperature^{4,15,16} via two mechanisms—passive and active warming. In passive warming, the patient is covered, and heat loss can be minimized. The more of the body that is covered the better it is.¹⁷ By using one blanket, heat loss can be reduced by 33%, and a second blanket can reduce it by a further 18%.¹⁶ In active warming, several different procedures are available: forced-air cover, circulating water mattress/garment, carbon fiber blankets, infrared heating ceiling, warm circulating water with pulsing negative pressure,^{18,19} heated intravenous or irrigation fluids,²⁰⁻²² and/or maintaining ambient room temperature at 23°C.²³ However, a more effective way to maintain normal body temperature and minimize negative effects of redistribution is to prewarm patients before anesthesia. A reduction of the temperature difference between the core and the peripheral is achieved.^{11,24-26} Ten minutes of prewarming is sufficient and effective,²⁵ and the patient's experience is more comfortable.¹¹

The American Society of PeriAnesthesia Nurses^{27,28} and the National Institute for Health and Care Excellence²⁹ provide international guidelines that provide an algorithm for how perioperative professional caregivers can prevent hypothermia during the perioperative period. Unfortunately, in Sweden, there are no such guidelines. Since postoperative wound infections could be a consequence of hypothermia, two evidence-based recommendations have been compiled in Sweden about preventing postoperative wound infections, one part of which concerns measures for maintaining patients' normal body temperature

(normothermia): the National Board of Health and Welfare (NBHW)³⁰ and Swedish Association of Local Authorities and Regions (SALAR).³¹

Recommendations of NBHW³⁰

- Patients should maintain normal body temperature before, during, and after surgery and may not be cooled; the risk of postoperative infections increases with cooling. Forced-air cover, heated operating table, warm blankets, heated infusion fluids, and well-heated rooms should be used.

Recommendation of SALAR³¹

- Use forced-air cover. This is applied as early as possible in the process, preferably before anesthesia induction. Add the cover before the patient comes so that the operating table is heated in advance.
- The rooms where the patient is staying before anesthesia should be well-heated. Use proper blankets. The operating theater (OT) should be warm, preferably 24°C to 25°C but never below 22°C.
- Use actively heated intravenous fluids.
- The patient should have padded leg covers during surgery.

According to the Swedish Patient Safety Act,³² all team members in an OT have responsibility for patient safety and are to avoid clinically adverse events by using evidence-based knowledge, practice, and science. Furthermore, the competence description for nurse anesthetists (NAs) states that they are to observe, monitor, document, and follow the patients' temperature. Before, during, and after the surgery, the NA is to make relevant observations of the patient's condition. Based on these assessments, evaluation and conclusions about the patients' needs and resources are to be made. For a positive patient outcome in the postoperative recovery period, the NAs are to work preventively.³³ Furthermore, Nightingale³⁴ and Harmer and Henderson³⁵ wrote of the importance of the environment for patients' health. The first rule is "to keep the air he breathes as pure as the external air, without chilling him" (s.18); it is also pointed out that it is important to secure the temperature in order not to chill down the patient.³⁴ In a perioperative setting, patients are exposed

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