Postoperative Warming of Children With Hypothermia

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PATIENTS RARELY REMEMBER much of the happenings surrounding surgery and anesthesia. If they do, it usually has something to do with *those warm blankets*. Keeping patients warm in the postanesthesia care unit will likely remain at the top of the nurse's priority list for several reasons. Although we appreciate being remembered for bringing comfort to our patients, hypothermia effects can range from increased blood loss to dysrhythmias. These Chinese researchers sought to expand our knowledge about best practices to treat postoperative hypothermia in very young children.

Effect of an electric blanket plus a forced-air warming system for children with postoperative hypothermia: A randomized controlled trial by Xiaohui Liu; Yufang Shi; Chunguang Ren; Xia Li; Zongwang Zhang. *Medicine*. 2017;96:26.

Background and Purpose

Defined as less than 36°C or 96.8°F, children with hypothermia after general anesthesia and surgery present as a vulnerable group for hypothermia's detrimental effects. Children's limited regulatory capacity of the central nervous system, asymmetrical body surface area, and lower amounts of subcutaneous fat put them at greater risk for postoperative complications. Currently, no guidelines are available for rewarming hypothermic children in the postanesthesia care unit (PACU). Therefore, the purpose of this study was to evaluate three methods of rewarming among pediatric patients with hypothermia in the PACU.

Methodology

After institutional review board approval of the randomized controlled trial, researchers recruited children over a 6-month period in 2016. To be included, participants met the following criteria: age younger than 3 years, American Society of Anesthesiology class I or II, nontracheal intubation, general anesthesia, operation time less than 30 minutes, and rectal temperature below 36°C (98.6°F) on arrival to the PACU. Patients with a history of congenital or neuropsychiatric disease, blood loss over 50 mL, reoperation within 24 hours, or requiring emergency surgery were ineligible to participate.

A total of 346 children were enrolled and randomly assigned into three study groups: C group received the regular blanket; E group received a prewarmed electric blanket (controlled between 37° [98.6°F] and 40°C [104°F]); and the EF group received both the electric blanket and a Bair Hugger forced-air warming system set at 38°C (100.4°F). All patients received moist oxygen and rectal temperature checks every 10 minutes for 30 minutes, then every 15 minutes until discharged from the PACU. Once the patient's temperature reached 36°C (98.6°F) or higher, the rewarming time was recorded. Rewarming rates were calculated for each patient by dividing the increase in rectal temperature by the minutes of rewarming time. Other outcomes included perioperative rectal temperature, perioperative hemodynamics (mean arterial pressure [MAP] and heart rate [HR]), length of PACU stay, and incidences of adverse events.

Once statistical assumptions were met, researchers performed the appropriate analyses using a recent version of SPSS. Probability of statistical significance was set with a P value of $< .05$.

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Conflict of interest: None to report.

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Results

Of the 346 patients enrolled who met the inclusion criteria, 108 were in group C, 123 were in group E, and 115 were in group EF. All groups were similar in terms of age, gender, body mass index, American Society of Anesthesiologists grade, type of surgery, and time in anesthesia and surgery. Furthermore, baseline MAP and HR were similar across groups. MAP and HR in group EF were significantly higher than the other two groups during the first 30 minutes in the PACU. No differences in terms of time in surgery, duration of anesthesia, fluid requirements, blood loss, or use of ketamine and propofol existed across the groups.

Rewarming times varied among the groups with the slowest occurring in group C, followed by group E, and then group EF. Group C required an average of 63.47 minutes; group E 54.86 minutes; and group EF only 35.61 minutes. In addition, rectal temperatures varied with the greatest increase in group EF. Adverse events occurred less frequently in group EF compared with those in groups C and E. Arrhythmias occurred 16 times in group C, 15 times in group E, and 5 times in group EF. Shivering was less frequent in group EF (12 times), versus group C (32 times) and group E (26 times). Nausea and vomiting were both significantly lower in group EF. The groups did not differ on incidences of hypoxemia, hypotension, or hypertension.

Conclusions

Using a combination of an electric blanket and the Bair Hugger system provided the most effective rewarming approach for young children with postoperative hypothermia. Arrhythmias, shivering, nausea, and vomiting were also reduced in the group that received the dual method of warming in the PACU.

Researchers used definitions of the World Health Organization and the American Society of PeriAnesthesia Nurses regarding safe core temperatures. Although previous research has supported forced-air warming as the most effective means of maintaining normothermia among children, cost has been cited as prohibitive in some cases. This study indicates that reducing PACU stay and hypothermia risks for children by using this combined approach may be well worth the investment.

Although a prospective randomized controlled trial, researchers identified some limitations. First, the study was conducted at a single site. Also, only children with operating times less than 30 minutes were included. Finally, they did not consider the potential risk of hyperthermia occurring in the study. Future research could address these limitations and increase the generalizability of their important findings.

Perianesthesia Nursing Implications

Sick children tug on our hearts. PACU nurses hold crucial positions to relieve their suffering caused by postoperative hypothermia. This study reported three possible nursing interventions with clear benefits to the group who received both an electric blanket and a forced-air warming device.

So, how do we respond to these findings? First, we assess what our current practices are and why. Do we routinely use warmed blankets and only additional devices when ordered or dire situations present? What are the current alternatives, for example, an electric or forced-air warming blanket, at our disposal? How much would it cost to increase our options, and how much would it benefit the patients and the facility to do so?

Too often, we talk ourselves out of action before taking any real steps to make a change. However, we can choose a different path. Talk to each other about the findings of this study. Consider how these results fit (or not) into your own practice experiences. Inventory the available equipment and usage data. Discuss with the unit manager the advantages of doing a cost-benefit analysis. Start small, if necessary, but be persistent. Follow the literature and stay abreast of additional reports to undergird implementation of best practices for our patients, especially the young and vulnerable.