



Managing peri-operative hypothermia in a post anaesthetic care unit: Comparison of preheated Thermarmour® blanket versus Bair® Hugger

Bull C¹, Perrin S², Menon R¹

¹ Leeds Teaching hospitals

² Mid Yorkshire Hospital Trust

BACKGROUND

Inadvertent perioperative hypothermia (IPH) is defined as a core temperature less than 36 °C [1]. IPH is associated with adverse patient events including increased blood loss and blood transfusion requirement [2], cardiovascular complications [3], wound infection [4], pressure sores [5] and prolonged recovery and hospital stay [6].

National Institute for Health and Care Excellence (NICE) guidance states that postoperative patients should not be transferred from the post anaesthetic care unit (PACU) back to a ward until the patient's temperature is 36.0°C or above [1]. If the temperature is below 36.0°C, they should be actively warmed using forced-air warming. In this trust the Bair® Hugger system is used.

The aim of this study is to assess if pre-heated Thermarmour® blankets can be used to actively warm postoperative hypothermic patients in the PACU of the main theatre complex at Leeds General Infirmary. This will be compared to the current standard of care of using the Bair® Hugger active warming device.

METHODS

Patients over 16 years of age with an initial recorded temperature in PACU of 35.3°C -36°C were recruited into the study. Patients were randomly assigned to receive Bair® Huggers or pre-warmed Thermarmour® blankets in order to actively increase tympanic temperature. Patients with a temperature <35.3°C were excluded from the study to ensure patient safety.

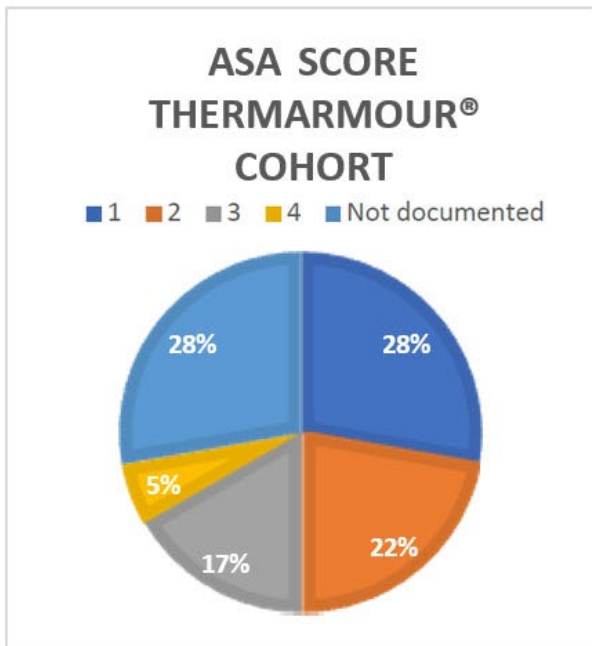
A standardised proforma was used to record data. Information recorded by PACU nursing staff included; patient demographics, ASA grade, surgical specialty, type of anaesthetic and the tympanic temperature at 15-minute intervals or when deemed clinically necessary. Data collection was ceased once the patient's temperature was greater than 36°C.

When using the preheated Thermarmour® blanket the patient's temperature must have increased by 0.2 °C every 30 minutes. To warm the Thermarmour® blanket prior to use, it was placed in an Enthernics model EC340 warmer, at a temperature of 93°C for 1 hour prior to use. If the patient's temperature did not adequately increase in the allocated time frame indicated, the Thermarmour® blanket was replaced with the Bair® Hugger to ensure patient safety.

RESULTS

Data for 26 patients was recorded (Thermarmour®= 18, Bair® Hugger= 8). In the Thermarmour® group the average age was 50.7 years with the most common ASA score 1 (figure 1a) and in the Bair® Hugger cohort the average age was 65.6 years with the most common ASA grade 2 (figure 1b). There was an equal ratio of male to female sex in the Thermarmour® cohort but predominantly female (6:2) in the Bair® Hugger group.

Figure 1: ASA Grade in Thermarmour® (a) and Bair® Hugger (b) cohorts.



b)

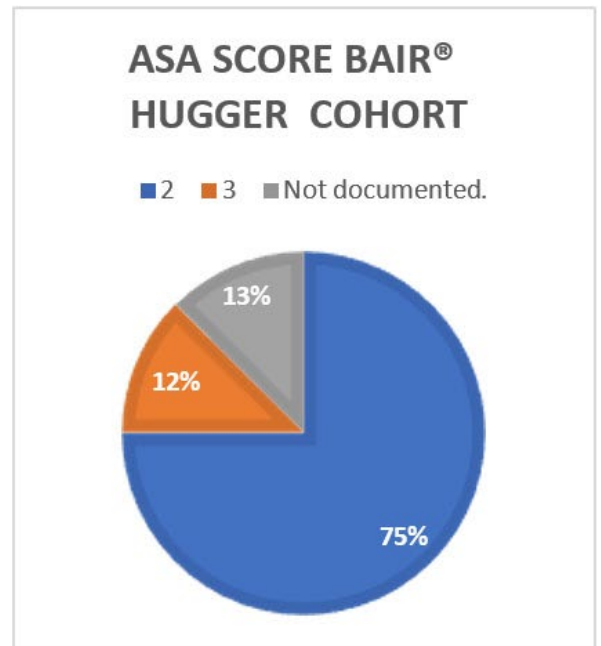
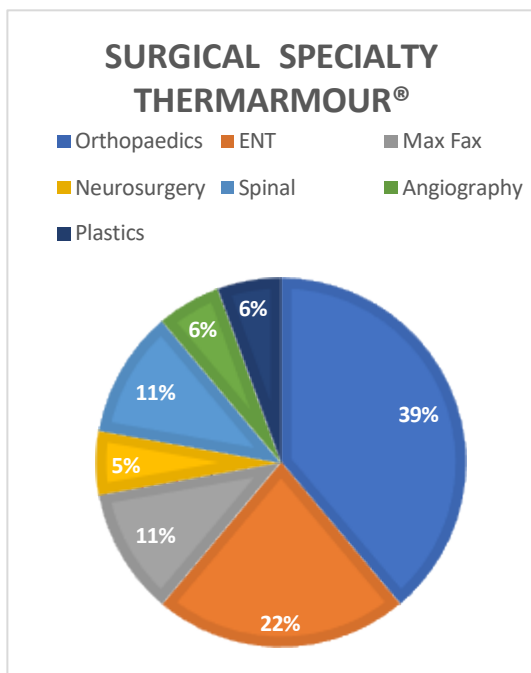


Figure 2 demonstrates the surgical specialty of patients in each group with orthopaedics forming the majority of cases in each group. Figure 3 demonstrates the type of anaesthetic performed with a general anaesthetic alone being administered in the majority of cases for both groups.

Figure 2: Surgical speciality in Thermarmour® (a) and Bair® Hugger (b) cohorts.



b)

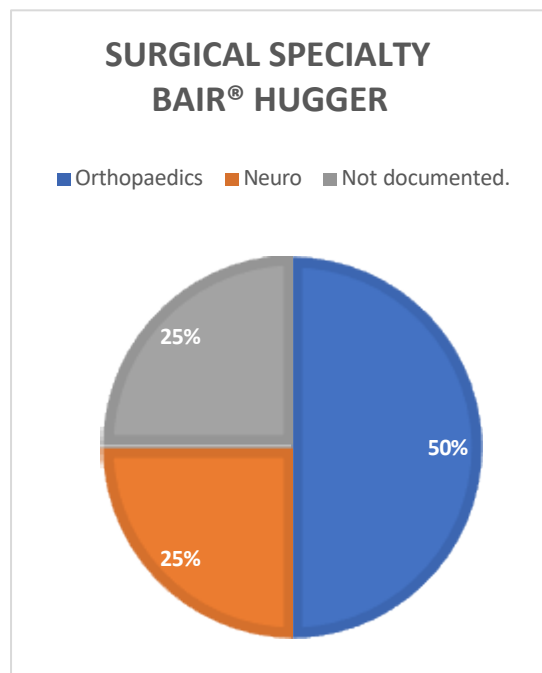
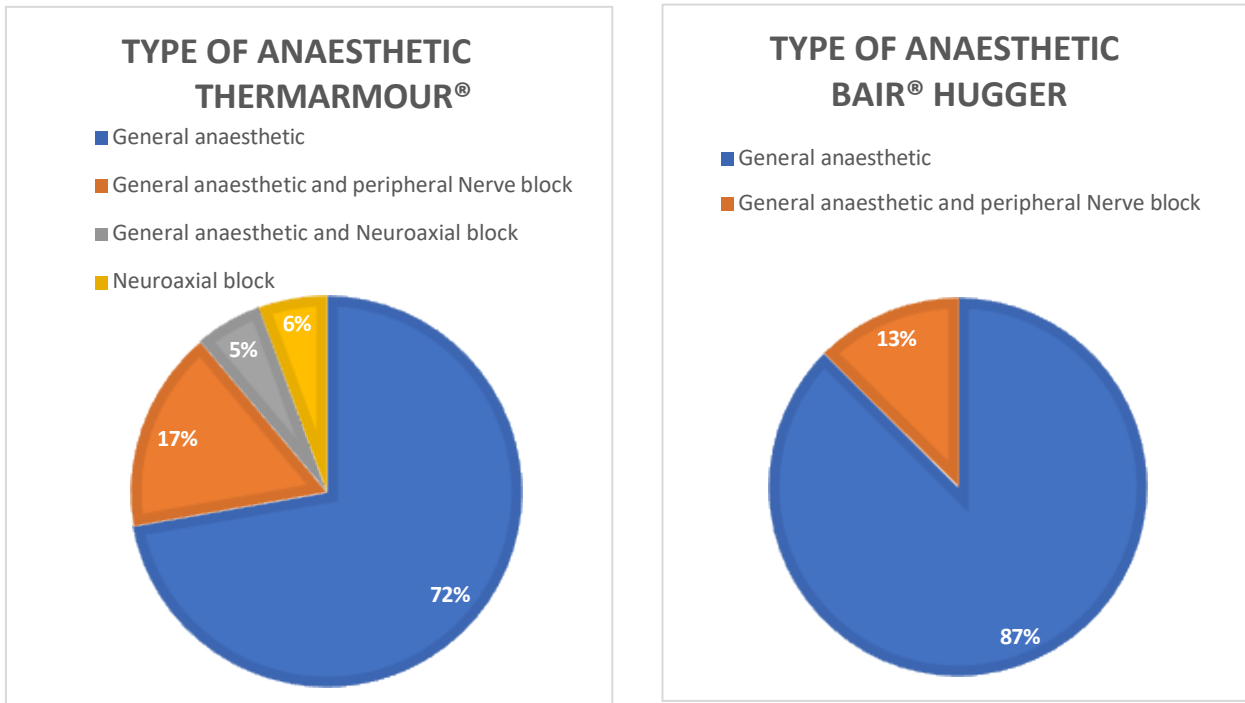
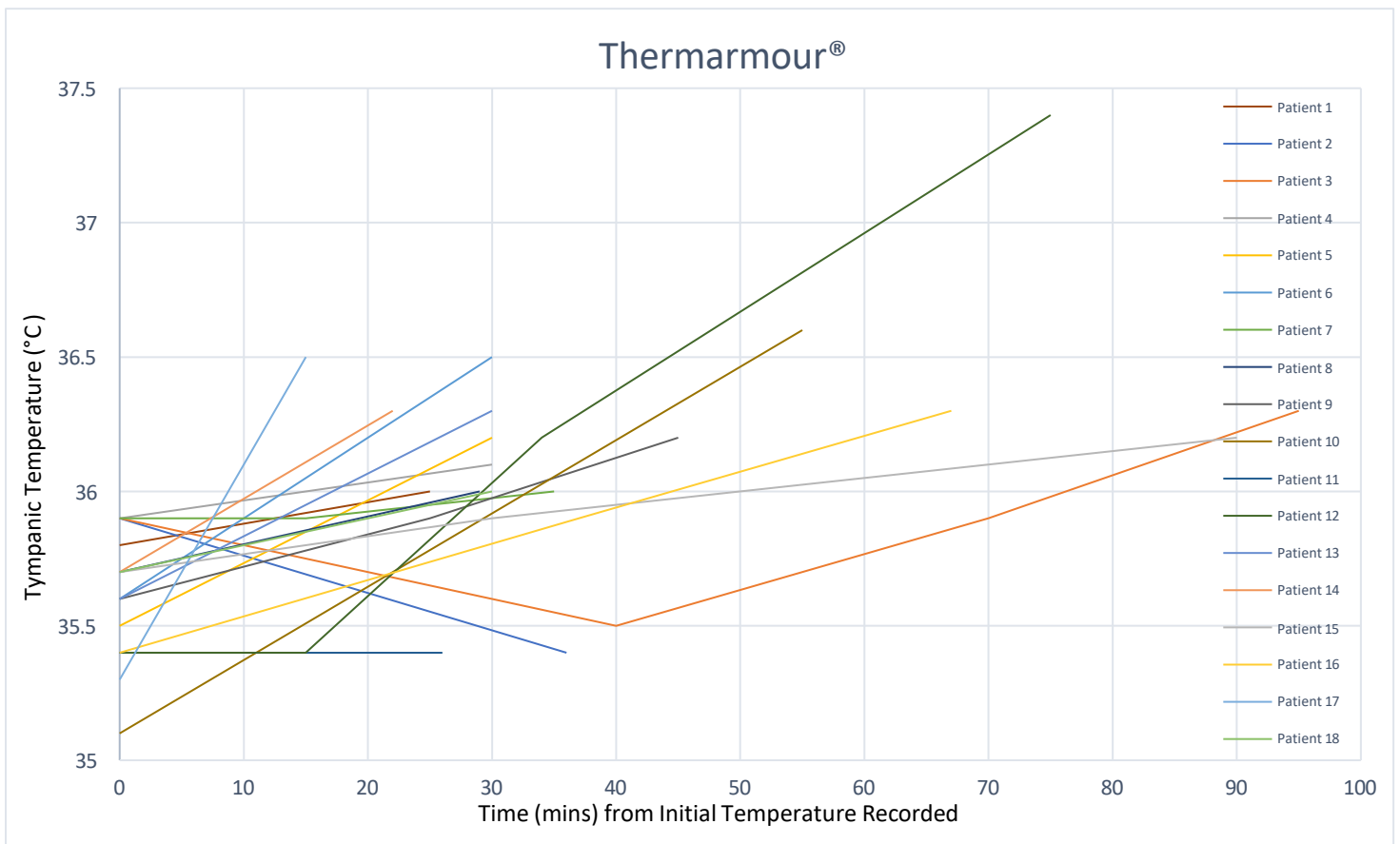


Figure 3: Type of anaesthetic performed in Thermarmour® (a) and Bair® Hugger (b) cohorts.

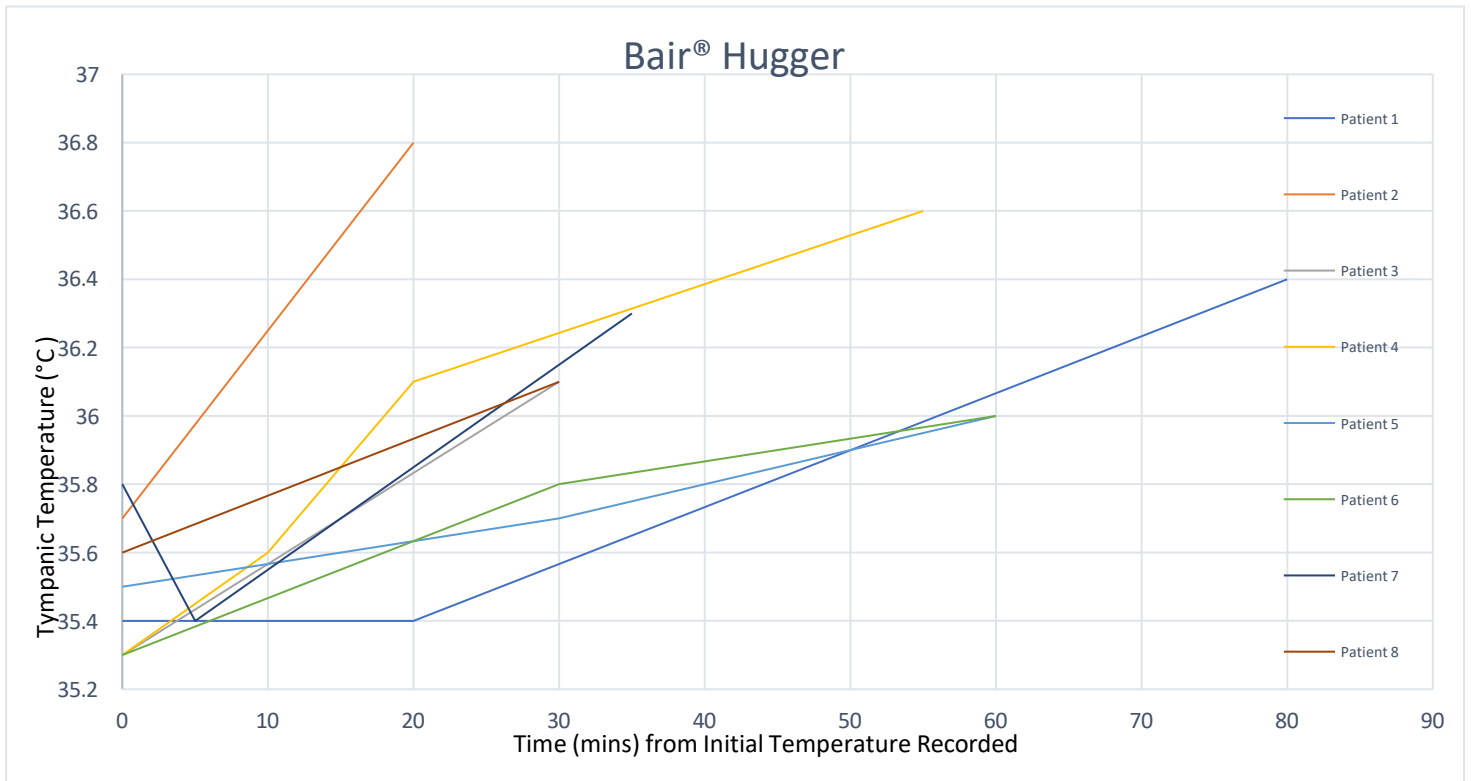


Graph 1 shows the change in tympanic temperature over time from initial recorded temperature during patient stay in PACU for the Thermarmour® (a) and Bair® Hugger (b) cohorts.

Graph 1:
a)

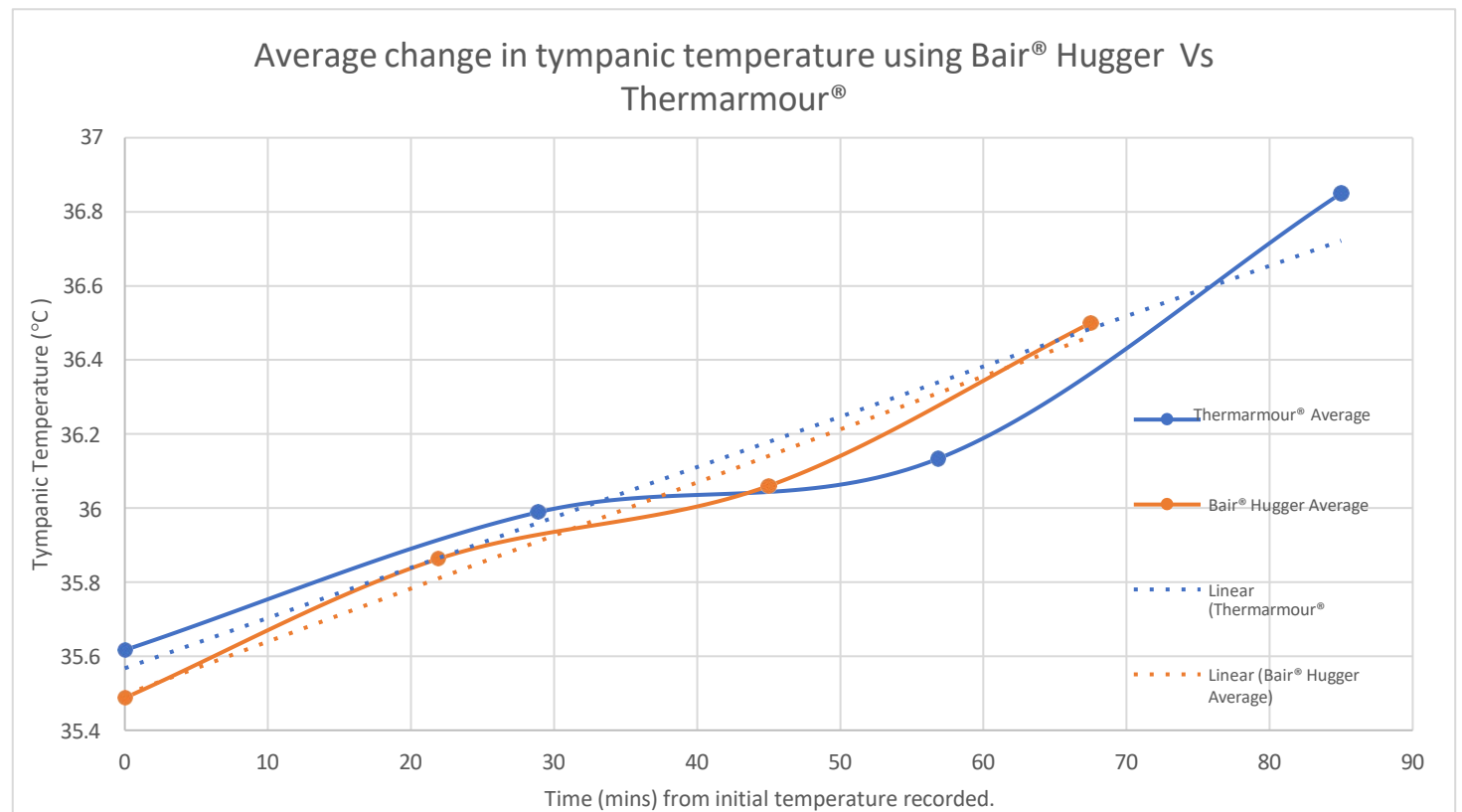


b)



Graph 2 demonstrates the average change in tympanic temperature against the average time from the initial temperature recorded in each group.

Graph 2:



Two out of the 18 (11.1%) patients who were allocated to use the preheated Thermarmour® blankets had their trial abandoned due to an inadequate increase in tympanic temperature, as set out in the inclusion criteria.

DISCUSSION

This study demonstrates that both the preheated Thermarmour® and Bair® Hugger are successful in increasing the patient's tympanic temperature during the PACU period.

The type of operation and type of anaesthetic were similar between the two groups. It is noted that in the Bair® Hugger cohort the average age and ASA score was higher, and the average starting temperature was lower. This may suggest that the Bair® Hugger is superior in actively warming patients of increased disease severity, reduced physiological reserve and in those who are more hypothermic. However further studies would be required to see if this is a clinically significant hypothesis.

The average time taken to achieve the desired temperature of 36.0°C as set out by NICE was similar in both groups, approximately 33 minutes for the preheated Thermarmour® versus 35 minutes for the Bair® Hugger. Limitations include the small sample size of the study, and in particular the smaller sample of the Bair® Hugger. This may lead to errors in analysis of the results and conclusions.

Another potential cause of error includes the preheating time for Thermarmour® blankets. The study dictated that blankets should be left in the warmer for at least one hour prior to use, this was often not the case. The time that the blanket spent in the warmer was not accurately recorded. This may mean that Thermarmour® blankets preheated to different temperatures may have been used during the study.

CONCLUSION

By analysing the data collected we conclude that the preheated Thermarmour® and Bair® Hugger perform comparably in actively warming patients with IPH in the postoperative PACU period. In addition, cost analysis reveals a potential saving of £5.30 for each patient if the Thermarmour® is adopted by the PACU department, a significant cost benefit for the department.

REFERENCES

1. Hypothermia: prevention and management in adults having surgery Clinical guideline [CG65] Published date: April 2008 Last updated: December 2016
2. Schmied H, Kurz A, Sessler DI, Kozek S, Reiter A. Mild hypothermia increases blood loss and transfusion requirements during total hip arthroplasty. *Lancet* 1996; 347: 289–92
3. Frank SM, Fleisher LA, Breslow MJ, et al. Perioperative maintenance of normothermia reduces the incidence of morbid cardiac events. A randomized clinical trial. *JAMA* 1997; 277: 1127–34
4. Melling AC, Ali B, Scott EM, Leaper DJ. Effects of preoperative warming on the incidence of wound infection after clean surgery: a randomised controlled trial. *Lancet* 2001 ; 358 : 876 – 80
5. Scott EM, Leaper DJ, Clark M, Kelly PJ. Effects of warming therapy on pressure ulcers—a randomized trial. *AORN J* 2001 ; 73 : 921 – 7 , 9–33, 36–8
6. Lenhardt R, Marker E, Goll V, et al. Mild intraoperative hypothermia prolongs postanesthetic recovery. *Anesthesiology* 1997 ; 87 : 1318 – 23