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The Effect Of Blanket Warmers On Hypothermia In Patients Under General Anesthesia In The Recovery Room Of Siaga Medika Hospital, Purbalingga

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Abstract

Postoperative hypothermia is a significant clinical complication for patients undergoing general anesthesia, often resulting from impaired thermoregulation and cold environmental exposure in the operating theater. This study aimed to evaluate the influence of a blanket warmer on body temperature stabilization in postoperative patients experiencing hypothermia in the recovery room. A quantitative study with a pre-experimental one-group pretest-posttest design was conducted at RSU Siaga Medika Purbalingga. The study included 40 patients selected via purposive sampling who met the inclusion criteria. Body temperature was measured before and at 5, 10, and 15-minute intervals following the application of a blanket warmer. The data were analyzed using the Kruskal-Wallis test. The results demonstrated that the mean temperature increased significantly from 34.71℃ at baseline to 36.35℃ after 15 minutes of intervention ($p<0.001$). These findings indicate that the blanket warmer is highly effective in increasing core body temperature and facilitating a return to normothermia within the recovery phase. Implementing this non-pharmacological intervention as a standardized nursing protocol is essential to enhance patient comfort, reduce recovery duration, and minimize anesthesia-related complications.

Keywords: Blanket Warmer, General Anesthesia, Hypothermia, Postoperative Care, Recovery Room.

INTRODUCTION

General anesthesia is an essential surgical procedure designed to induce controlled unconsciousness, eliminate pain perception, and prevent unwanted motor reflexes during surgery (Asiyah et al., 2023). Globally, this procedure is the gold standard for the success of complex surgeries, but significant challenges arise in the postoperative phase in the recovery room (Vonny et al., 2024). One of the most common complications is post-anesthetic hypothermia, which affects millions of patients annually worldwide (Wardhani, 2025). This condition requires serious medical attention due to its impact on patient comfort, the rate of anesthetic drug metabolism, and the duration of postoperative recovery (Restu Gilang Ramadhan & Wilis Sukmaningtyas, 2023).

In Indonesia, the prevalence of post-general anesthesia hypothermia is quite high, especially in areas with high surgical procedures, such as Java (Wardhani, 2025). Observational data from central surgical units often indicates that patients undergoing major surgical procedures lasting more than 60 minutes are more susceptible to a drop in body temperature below normal limits (Tubalawony & Siahaya, 2023). The primary triggering factor is the loss of the body's thermoregulatory ability, managed by the hypothalamus, due to the effects of anesthetic agents, which is then exacerbated by exposure to cold temperatures in the operating room (Vonny et al., 2024). Consequently, maintaining body temperature is a crucial aspect of patient safety management in the recovery room to prevent further complications (Tubalawony & Siahaya, 2023).

Previous research has explored various interventions to mitigate postoperative body temperature reduction, with a primary focus on non-pharmacological warming methods. A study by Jarod et al. (2024) demonstrated that the use of a blanket warmer significantly increased body temperature within the first 30 minutes of recovery with a p-value <0.05. Similar findings were also reported by Listiyanawati and Noriyanto (2018), who confirmed that the use of a blanket warmer had significantly superior thermal efficacy compared to the use of conventional cloth blankets in stabilizing body temperature in patients after cesarean section. However, the effectiveness of these interventions is often influenced by variations in the duration of surgery and the patient's initial clinical condition upon entering the recovery room (Tubalawony & Siahaya, 2023).

Although the effectiveness of blanket warmers has been supported by various literature, there are varying results regarding the rate of temperature stabilization in various patient populations and surgical durations. Several studies have shown inconsistent patient responses to warmers, often attributed to differences in baseline body temperature and individual metabolic responses after anesthetic withdrawal (Jarod et al., 2024; Listiyanawati & Noriyanto, 2018). Furthermore, there is limited literature on the integration of specific blanket warmer protocols into Standard Operating Procedures (SOPs) at certain regional healthcare facilities in Indonesia. The lack of standardization in managing hypothermia in the recovery room often hinders optimal patient recovery (Tubalawony & Siahaya, 2023; Vonny et al., 2024).

This study aims to fill this gap by evaluating the effect of blanket warmers on the incidence of hypothermia in patients undergoing general anesthesia at Siaga Medika General Hospital, Purbalingga. The urgency of this study is based on preliminary data showing a high incidence of hypothermia in post-general anesthesia patients with surgery durations exceeding 60 minutes at the hospital. By empirically testing the efficacy of blanket warmers, this study is expected to provide a theoretical contribution to enriching the literature on anesthesia nursing in Indonesia, as well as a practical contribution in the form of a proposed development of evidence-based standard operating procedures (SOPs) to improve service quality, accelerate the recovery process, and ensure postoperative patient safety.

RESEARCH METHODS

This study used a quantitative design with a pre-experimental approach through a one-group pretest-posttest design to analyze the effectiveness of the intervention. This approach allows researchers to measure the dependent variable before and after treatment administration to the same group, as described in the methodological literature (Sugiyono, 2021; Rukminingsih & Adnan, 2020). This design is considered most appropriate for evaluating changes in patient body temperature after anesthesia as a direct impact of the blanket warmer intervention (Arikunto, 2010; Jarod et al., 2024).

The population in this study included all patients undergoing general anesthesia at Siaga Medika General Hospital, Purbalingga, during September 2025. The sampling technique used was purposive sampling based on strict inclusion and exclusion criteria. The sample size was determined using the Slovin formula to achieve an accurate representation of the population identified as experiencing postoperative hypothermia (Sugiyono, 2021; Wardhani, 2025). With a 5% margin of error, a total of 40 patients who met the clinical requirements and were willing to participate were included in this study.

The research instruments consisted of a blanket warmer as an intervention tool, a digital thermometer for accurate temperature measurement, a timer, and a structured observation sheet. The validity and reliability of the instruments were ensured through the use of calibrated measuring instruments and systematic observation procedures (Sugiyono, 2021; Nugraheni & Windiarti, 2024). The use of an observation sheet that recorded temperature changes at specific time intervals (5, 10, and 15 minutes) aimed to document the dynamics of body temperature increase objectively and measurably.

The research procedure was carried out in three systematic stages: preparation, implementation, and reporting. The preparation phase included ethical clearance and coordination with surgical unit staff, while the implementation phase included pre-test measurements, a 15-minute blanket warmer intervention, and post-test measurements (Asiyah et al., 2023; Tubalawony & Siahaya, 2023). The entire series of interventions was carried out in the recovery room under close supervision by researchers and nurses to ensure patient safety and comfort throughout the process.

Data analysis was conducted using univariate and bivariate statistical approaches to test the significance of the treatment effect. Measurement data that had gone through the editing, coding, entry, and cleaning stages were analyzed using the Shapiro-Wilk test to determine data normality, followed

by ANOVA or Kruskal-Wallis tests to test for differences in mean or median temperatures before and after the intervention (Muchtar et al., 2023; Nugraheni & Windiarti, 2024). The use of relevant statistical software ensured the accuracy of the analysis results in objectively answering the research hypotheses.

Research ethics principles are strictly implemented, adhering to five basic principles: respect for persons, confidentiality, beneficence, non-maleficence, and justice. Patient data confidentiality is fully guaranteed in accordance with medical ethics standards, and all interventions are carried out with subject safety in mind and avoiding potential risks of harm (Wardhani, 2025). This research process has also received official permission from the relevant agencies, ensuring that each stage of the research is conducted in accordance with applicable legal and moral standards.

RESULTS AND DISCUSSION

Univariate Analysis

Respondent Characteristics Based on Age and Gender

Table 1. Frequency Distribution of Respondent Characteristics

Respondent Characteristics	Frequency (f)	Percentage (%)
Gender		
Man	17	42.5
Woman	23	57.5
Age		
12-19 Years	8	20
20-44 Years	18	45
45-59 Years	8	20
60-74 Years	6	15
Type of Operation		
Orthopedic Surgery	25	62.5
Oral Surgery	5	12.5
General Surgery	10	25.0
Operation Time		
60 Minutes	12	30.0
60-90 Minutes	20	50.0
90-120,000 Minutes	9	22.5

Based on Table 1 showing the results of respondent characteristics, it can be concluded that of the 40 patients studied based on age and gender characteristics, the majority of respondents were in the adult age range of 20-44 years (45%), the majority of respondents were female (57.5%), the majority of patients with orthopedic surgery (62.5%) and the majority of patients with surgery duration of 60-90 minutes (50.0%).

Measurement Time	Mean	Min	Max	Elementary School
Pre-test Temperature	34,713	33.2	35.8	0.6128
Post-test Temperature (5 Minutes)	35,265	33.9	36.1	0.4622
Post-test Temperature (10 Minutes)	35,815	35.2	36.3	0.2434
Post-test Temperature (15 Minutes)	36,345	36.0	36.8	0.1853

Patient Body Temperature Overview Pre-test and Post-test

Table 1. Frequency Distribution of Respondent Characteristics Based on Pre-test and Post-test Temperatures at Siaga Medika Hospital, Purbalingga

Based on Table 2, it shows that there was a consistent increase in body temperature every 5 minutes. The average temperature increased from 34.713°C in the pre-test to 36.345°C after 15 minutes of intervention, which means the patient had reached the normal temperature limit (>36°C).

Bivariate Analysis

Normality Test

Before conducting the influence test, a normality test was carried out using the Shapiro-Wilk test (because n = <50)

Table 3. Shapiro-Wilk Data Normality Test

Variables	Statistics	df	Sig.	Conclusion
Pre-test Temperature	0.955	40	0.116	Normal
Post-test Temperature (5 Minutes)	0.931	40	0.018	Abnormal
Post-test Temperature (10 Minutes)	0.934	40	0.022	Abnormal
Post-test Temperature (15 minutes)	0.957	40	0.133	Normal

Based on the table4. A sig. value of <0.05 was obtained at temperatures of 5 minutes and 10 minutes, indicating that the data were not normally distributed. Therefore, the analysis was continued using the non-parametric Kruskal-Wallis Test.

Influence Test (Kruskal-Wallis Test)

Table 4. Differences between Pre-test and Post-test Hypothermia Given Blanket Warmer in Post-General Anesthesia Patients

Variables	N	Mean Rank	Z	p-value
Pretest Temperature	40	30.43	126,755	0.001
TemperaturePost-test (5 minutes)	40	56.29		
TemperaturePost-test (10 minutes)	40	96.09		
TemperaturePost-test (15 minutes)	40	139.20		

Based on the results of the Kruskal-Wallis test, a p-value of 0.001 was obtained. Since the p-value <0.05, H0 is rejected and Ha is accepted, which means there is a significant effect of providing blanket warmers on increasing the body temperature of hypothermic patients.

Discussion

Respondent Characteristics Based on Age and Gender

Based on the research results, the gender of the majority of respondents was female (57.5%). According toSessler (2016)Women typically have a higher percentage of body fat, but they tend to have less muscle mass than men. Because muscles serve as a primary heat source through the shivering mechanism, women often exhibit a more significant decrease in body temperature when shivering, and women often exhibit a more significant decrease in body temperature when exposed to cold conditions in the operating room compared to men.

Women physiologically have a higher percentage of body fat than men, and this difference is a biological phenomenon consistently found across age groups and populations. In general, adult women have a body fat percentage of around 25–31%, while men have a body fat percentage of 18–

24%. This difference is not solely due to lifestyle factors, but is primarily influenced by hormonal regulation, body composition, and biological functions related to reproduction. Estrogen, the dominant hormone in women, plays a key role in increasing fat storage, particularly in subcutaneous fat tissue in the gluteofemoral region (hips and thighs). Estrogen increases the activity of the enzyme lipoprotein lipase (LPL), an enzyme that facilitates the uptake of fatty acids from the bloodstream into adipose cells, thus making the fat storage process more efficient. Conversely, higher testosterone levels in men play a role in increasing muscle mass and basal metabolic rate, thus increasing energy expenditure over fat storage.(Palmer, B.F., & Clegg, 2018).

Based on age, the majority of respondents fell into the adult age category (20-44 years), with 18 respondents (45%). Physiologically, age influences the body's ability to regulate temperature. Adults generally have better metabolic reserves than older adults. However, in this study, the 60-74 age group (15%) received special attention. This is in line with the theoryGuyton (2019)because the decreased basal metabolic rate and amount of subcutaneous fat in the elderly makes them more susceptible to more severe hypothermia and requires a longer temperature recovery time.

In young adulthood (18–40 years), women's body fat percentage tends to remain relatively stable, at around 25–31%, which is considered a normal physiological range. During this phase, reproductive hormone balance remains optimal, so fat distribution is dominated by subcutaneous fat with a gynoid pattern. Fat in young adulthood plays an important role as a metabolic energy reserve and supports reproductive function, including the body's readiness for pregnancy and lactation. Although relatively stable, fat percentage can still slowly increase due to decreased physical activity or changes in basal metabolism.(Karastergiou et al., 2024).

In late adulthood and pre-menopause (40–50 years), there is an increase in body fat percentage accompanied by a decrease in muscle mass and basal metabolic rate. Decreased heat production due to reduced muscle mass reduces the body's ability to generate heat through shivering and metabolic processes. Furthermore, fat distribution begins to shift from the subcutaneous to the central (abdominal) area, reducing the effectiveness of fat as a heat insulator in the periphery. The combination of decreased heat production and changes in fat distribution makes women in this age group more susceptible to decreases in core temperature, especially under physiological stress conditions such as surgery, exposure to low operating room temperatures, or the use of cold intravenous fluids.

The risk of hypothermia increases with advancing age and post-menopause (>50 years). During this phase, women's body fat percentage generally reaches its highest value, often exceeding 32–35%, accompanied by a significant decline in estrogen levels. This decrease in estrogen results in impaired peripheral vasoconstriction and a decreased thermoregulatory response to cold. Furthermore, increased visceral fat and decreased subcutaneous fat lead to a less effective heat-insulating function. This condition is exacerbated by sarcopenia, a decrease in muscle mass and strength, which reduces the body's ability to actively generate heat. Consequently, elderly women have a very limited capacity to maintain core body temperature and are at highest risk for hypothermia, both spontaneously and after anesthesia.

The majority of respondents (25 patients, 62.5%) underwent orthopedic surgery, which requires extensive incisions and lengthy procedures, increasing the incidence of hypothermia. Perioperative hypothermia is a common complication in patients undergoing surgery, particularly orthopedic surgery, due to the combination of anesthesia, prolonged surgical duration, and exposure to a cold operating environment that progressively increases body heat loss. Orthopedic surgery is generally categorized as a major surgical procedure, often lasting more than one to two hours, particularly for procedures such as total joint replacement or complex fracture repair. This exposes the patient's body to disruptions in thermoregulatory mechanisms for longer than in shorter operations. General or regional anesthesia used in orthopedic surgery causes peripheral vasodilation and inhibits the autonomic thermoregulatory response, shifting blood flow from the core to the surface, accelerating heat loss through conduction and radiation. Furthermore, the deliberately low operating

room temperature to minimize microbial growth contributes to the tendency for body temperature to decrease during surgery. Retrospective studies in orthopedic patients have shown that longer surgical duration is an independent risk factor for postoperative hypothermia, with the length of surgery being directly proportional to the decrease in the patient's core body temperature at the end of the procedure. Intraoperative hypothermia also correlates with the incidence of postoperative hypothermia, strengthening the relationship between prolonged surgical duration and the risk of impaired thermoregulation. Large epidemiological studies have reported a high frequency of intraoperative hypothermia in orthopedic patients and identified surgical duration as a statistically significant predictor of a decrease in patient temperature below 36°C, defined as clinical hypothermia. Therefore, prolonged orthopedic surgery weakens the body's physiological mechanisms for maintaining core temperature through a combination of the vasodilatory effects of anesthesia, exposure to external cold temperatures, and the accumulation of progressive heat loss, thereby increasing the risk of perioperative hypothermia, which can result in increased patient morbidity after surgery.

Patient Body Temperature Analysis Before Intervention (Pre-test)

The average initial body temperature of patients upon arrival in the recovery room was recorded at 34.713°C. This indicates that all patients experienced hypothermia (temperature <36°C). Hypothermia in patients undergoing general anesthesia at Siaga Medika Hospital, Purbalingga, is caused by several main factors. Drugs such as propyl and inhaled gases suppress the temperature-regulating center in the hypothalamus. According toButterworth et al. (2018)Anesthesia lowers the threshold for vasoconstriction, resulting in a shift in heat from the core to the periphery. In addition to internal factors, external factors such as the cold temperature of the operating room (generally between 18-22°C) and exposure of internal organs during surgery contribute to faster heat loss in patients.

The cold ambient temperature in the operating room (around 18-22°C) and the use of unheated IV fluids contribute to accelerated heat loss through radiation and convection. If these conditions are not promptly addressed in the recovery room, patients are at risk of serious problems such as impaired blood clotting, myocardial ischemia, and delayed drug metabolism, which can delay recovery. This is in line with studiesJarod et al. (2024)regarding the majority of post-general anesthesia patients experiencing mild hypothermia in the recovery room before active warming intervention was performed.

Research according toRauch et al., nd (2021)also confirmed that the hot phase is the primary cause of perioperative hypothermia, where core temperature can drop by 0.8-1.5°C within the first hour of anesthesia. This aligns with the results of this study, where all respondents showed body temperatures below 36°C in pre-test measurements in the recovery room.

Analysis of Patient Body Temperature After Intervention (Post-test)

After intervention with a blanket warmer at a temperature of 37-40°C for 15 minutes, there was a significant increase in temperature gradually in the first 5 minutes recorded with an average of 35.265°C, then 10 minutes with an average reaching 35.815°C and finally the average temperature reached 36.345°C in 15 minutes.

In this study, the patient's body temperature generally began to rise within the first few minutes after the blanket warmer was applied and peaked within the first 5–10 minutes. This phenomenon can be explained by the physiological mechanisms of thermoregulatory responses and heat transfer from external sources to the patient's body. In the initial warming phase, peripheral blood flow increases due to vasodilation, allowing the applied heat to be rapidly transferred from the skin surface to the circulation, subsequently increasing core body temperature. Furthermore, during the 5–10th minute, the temperature gradient between the warmer and the patient's body is still high, allowing conduction and convection to operate optimally. This condition causes the temperature to rise more rapidly, reaching a peak during this period. After this phase, the rate of temperature rise tends to slow or stabilize as the body begins to achieve thermal equilibrium, where homeostatic mechanisms work to prevent excessive temperature increases through regulation of blood flow and heat loss. Therefore, the

peak temperature rise in the 5–10th minute reflects the most effective phase of the initial warming process, before the body enters the temperature stabilization phase.

This temperature increase occurs through heat transfer through conduction. The warm air generated by the blanket warmer comes into direct contact with the patient's skin. These warm air particles transfer heat energy to the skin, which is then distributed by the bloodstream throughout the body. The advantage of a blanket warmer compared to a regular cloth blanket is its ability to provide consistent and controllable warmth, thereby reducing further heat loss while simultaneously actively increasing core temperature.(Sessler, 2016).

The Effect of Blanket Warmer on Hypothermia in Patients Under General Anesthesia

The Kruskal-Wallis test results showed a significance value (p-value) of 0.001 ($p<0.05$). These statistical results empirically prove that administering a blanket warmer is highly effective in raising a patient's body temperature after general anesthesia.

During the 15-minute monitoring period, the patient's body temperature showed a rapid increase in the initial phase and reached its peak value between the 5th and 10th minutes, before then experiencing a slowing trend. This pattern illustrates the body's initial physiological response to exposure to a heat source, where heat transfer is most effective when peripheral tissues are still at a lower temperature than the heating device. At the 5–10 minute interval, heat absorbed by the skin and subcutaneous tissue is sufficient to increase peripheral blood temperature, which then contributes to an increase in core temperature. After the 10th to 15th minute, the rate of temperature increase becomes smaller because the temperature difference between the body and the heat source begins to decrease, so that heat transfer is no longer as rapid as in the initial phase. Furthermore, activation of the body's homeostatic mechanisms plays a role in maintaining temperature stability by balancing heat intake and loss. Thus, the peak temperature increase at 5–10 minutes within a 15-minute duration indicates that the effectiveness of warming is most optimal in the initial phase of the intervention, while the subsequent phase is more focused on maintaining the achieved temperature.

Clinically, the average temperature increase is 1.6°C within 15 minutes. Applying a blanket warmer not only warms the skin but also helps the body suppress negative compensatory responses like shivering. Reduced shivering reduces the body's oxygen consumption, thus reducing the workload on the patient's heart and lungs during the recovery phase from anesthesia.

The blanket warmer used in this study demonstrated superiority over other heating methods because it provided faster, more even, and more controlled heating, effectively increasing and maintaining the patient's body temperature. Observations showed that the use of the blanket warmer resulted in a significant increase in temperature in the initial phase of the intervention and was able to maintain the temperature within the normothermic range stably throughout the monitoring period. This is because the blanket warmer works through an active heating mechanism with a wide distribution of heat over the body surface, thereby simultaneously reducing heat loss through radiation, conduction, and convection. Compared with passive heating methods such as conventional blankets or room temperature regulation, the blanket warmer provides more consistent heat transfer and does not depend on the patient's thermoregulatory abilities, which are often impaired by anesthesia. Furthermore, the blanket warmer is relatively easy to apply, safe to use, and allows temperature regulation according to the patient's clinical needs, thereby reducing the risk of hypothermia without increasing the risk of hyperthermia. These advantages indicate that the blanket warmer used in this study is a more effective and efficient warming intervention than other heating methods in preventing and managing perioperative hypothermia.

The administration of blanket warmers is carried out using the principle of gradual, safe heating, and according to the patient's needs. The patient who will be given a blanket warmer will first have their temperature checked using a thermometer, then prepare the blanket warmer and heat it. The blanket, which has been preheated in the blanket warmer cabinet at a certain temperature according to the patient's needs, is gradually removed and placed over the patient's body, especially areas with large surfaces such as the chest, abdomen, and extremities. In the post-anesthesia phase, blanket warmers

are used to help restore core body temperature that decreases due to the effects of anesthesia and exposure to the cold surgical environment. During administration, nurses must monitor body temperature regularly and ensure the blanket is not too hot, not damp, and does not cause excessive pressure on the patient's skin. Because the correct administration of blanket warmers can improve patient comfort and accelerate body temperature stabilization.

After administering a blanket warmer, patients generally responded positively, both physiologically and psychologically. Physiologically, patients showed a gradual increase in body temperature, a decrease in shivering, and stabilization of vital signs such as pulse and blood pressure. Post-anesthesia shivering, which often occurs due to hypothermia, can increase oxygen consumption and cardiac workload. The use of a blanket warmer has been shown to reduce this shivering response. Subjectively, patients often reported a feeling of comfort, warmth, and a reduction in cold sensations, which contributed to increased patient satisfaction with care. Furthermore, faster temperature recovery can also accelerate the post-anesthesia recovery process and reduce the length of stay in the recovery room.

Research resultJarod et al. (2024)also showed that blanket warmers were able to significantly increase the temperature of patients after general anesthesia in the first 30 minutes of the recovery phase. The research data showed that the patient's body temperature was at an average of 34.95°C and increased to 35.5°C with $p < 0.05$. This indicates that there was an average increase in temperature of 0.55°C during the 30-minute application of the blanket warmer. Although the duration of the intervention in this study was shorter, the increase in body temperature still occurred, indicating that the blanket warmer has high effectiveness in helping the recovery of the patient's body temperature after anesthesia.

In addition, researchListiyanawati & Noriyanto (2018)A study comparing the use of blanket warmers with regular cloth blankets showed that the group using the blanket warmer experienced a faster and more stable increase in body temperature. In the blanket warmer group, body temperature increased by an average of 0.6–0.9°C in 20–30 minutes, while in the regular blanket group, the temperature increase was only around 0.2–0.3°C in the same duration. This indicates that blanket warmers are more effective than passive heating methods.

Other research byRizki Sari Utami Muchtar (2021)stated that blanket warmers are effective in reducing the incidence of post-anesthetic shivering. In their study, the incidence of shivering decreased from 65% to 20% after the application of blanket warmers. This reduction in shivering was closely related to increased body temperature and stable thermoregulation in patients.

The results of this observation are in line with the study conducted byRositasari & Dyah (2017)which explains that the use of blanket warmers for patients after general anesthesia generally significantly increases body temperature compared to the use of regular blankets. In their study, patients' body temperature increased by an average of 0.6-1.0°C after the blanket warmer was administered, while in the group that only used regular blankets, the increase in body temperature was slower and not statistically significant. This indicates that blanket warmers have a more optimal ability to maintain and increase body temperature compared to passive heating methods.

The findings of this research are in line with the studyTubalawony & Siahaya (2023)which explains that active warming interventions such as blanket warmers can reduce the risk of hypothermia by more than 50% in postoperative patients with long-term anesthesia. The study emphasizes that patients with operations lasting more than 60 minutes are strongly advised to receive active warming immediately after surgery.

From a physiological perspective, the effectiveness of blanket warmers can be explained through the mechanisms of heat conduction and convection.Aprilia et al. (2024)Blanket warmers work by increasing the surface temperature of the skin, thereby reducing the temperature difference between the core and periphery of the body. This prevents the heat redistribution that often occurs after general anesthesia induction and accelerates the patient's recovery from core body temperature.

According to researchWardhani (2025)Studies have shown that patients who received blanket warmers achieved normothermia more quickly than those who did not receive active warming. Furthermore, patients reported higher levels of comfort and shorter recovery times in the recovery room. This demonstrates that blanket warmers impact not only physiological aspects but also psychological aspects and patient comfort.

According toMuchtar et al. (2023)Maintaining postoperative normothermia plays an important role in preventing further complications such as coagulation disorders, increased risk of bleeding, surgical wound infections and delayed wound healing.

Thus, based on the results of this study which are supported by various previous studies, it can be concluded that blanket warmers are a nursing intervention that has been scientifically proven to be effective in preventing and treating post-general anesthesia hypothermia, as well as providing additional benefits in the form of increased comfort and accelerated patient recovery.

Research Limitations

A limitation of this study is that the researchers did not control the temperature of the IV fluid given in the operating room, which could have influenced the degree of initial hypothermia.

CONCLUSION

Based on the results of the data analysis and discussion that has been carried out, it can be concluded that the administration of a blanket warmer for 15 minutes has a statistically significant effect on the increase in body temperature of post-general anesthesia patients in the recovery room of Siaga Medika Hospital Purbalingga, with a p-value of 0.001. This intervention has been proven effective in mitigating hypothermia conditions, where the patient's body temperature increased by an average of 1.6°C to reach the normothermia range. This success is supported by an active heat transfer mechanism through conduction that provides a consistent warm temperature, thereby accelerating physiological recovery and reducing the shivering response that can burden the work of the patient's heart and lungs postoperatively.

However, this study has limitations because it did not control the temperature of the intravenous fluids administered during the surgical procedure, which is a potential contributing factor to the degree of initial hypothermia in patients. Therefore, future researchers are advised to include the variables of IV fluid temperature and duration of exposure to the surgical environment in a more complex experimental design to provide a more comprehensive picture. Practically, the results of this study emphasize the importance of integrating the use of blanket warmers into Standard Operating Procedures (SOPs) in the recovery room as an evidence-based non-pharmacological intervention to improve the quality of health care and ensure optimal postoperative patient safety and comfort.

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