ASSESSING THE EFFICACY OF ELECTRIC BLANKETS IN ELEVATING BODY TEMPERATURE AMONG POST OPERATIVE HYPOTHERMIC PATIENTS

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ABSTRACT

The study conducted at the Dumai Hospital Post-Surgical Room aimed to investigate the effectiveness of using electric blankets in increasing body temperature in postoperative hypothermic patients. This research used quantitative "one-group pretest-posttest" as the design. The population consisted of 240 postoperative patients, and purposive sampling was used to select a sample of 20 patients. The research collected data in three stages. First, the patients' baseline body temperature was measured promptly following the surgical procedure. The patients were then treated with an electric blanket therapy for a standard duration of 10 to 15 minutes. The patients' body temperatures were measured again after the intervention period. The data analysis consisted of both univariate and bivariate analysis. Univariate analysis revealed the frequency distribution of respondent characteristics, including age, education, occupation, and prior operation history. The relationship between the independent variable (use of electric blanket) and the dependent variable (body temperature) was examined using bivariate analysis. The statistical test revealed statistically significant evidence supporting the effectiveness of electric blankets in increasing the body temperature of hypothermic patients following surgery. The findings contribute to the existing literature on hypothermia prevention and treatment by highlighting the significance of maintaining optimal body temperature for patient recovery.

Keywords: electric blanket; body temperature; hypothermia; postoperative

INTRODUCTION

Surgery is a medical procedure used to diagnose and treat various bodily disorders. This body portion is typically accessed through an incision. This procedure is invasive and entails numerous health risks (Rauch *et al.*, 2021). Unfortunately, there are numerous complications associated with surgical procedures. Postoperative complications are prevalent concerns in surgical patients (Rubio-Perez *et al.*, 2014). Additionally, operating rooms are typically kept at lower temperatures to optimize sterile conditions and equipment performance. Nevertheless, this lower ambient

temperature can contribute to heat loss in surgical patients, resulting in hypothermia (Mathews *et al.,* 2002). Postoperative hypothermia is a significant complication that can negatively impact patient outcomes. In addition, anaesthesia-induced vasodilation exacerbates the problem by increasing heat loss from the body's surface, thereby impeding the body's ability to regulate temperature.

Hypothermia, which is defined as a central body temperature below the normal range, is associated with a variety of adverse events, such as impaired wound healing, increased surgical site infections, cardiovascular instability, and prolonged hospital stays (Weenk *et al.,* 2018). (Rositasari and Dyah, 2017). Shivering, an involuntary muscular response characterized by rhythmic contractions, is the body's natural defense mechanism against hypothermia. It generates heat by increasing metabolic activity (Qi *et al.,* 2022).. However, shivering is not always effective at restoring normal body temperature, and patients may find it unpleasant. In addition, shivering expends a substantial quantity of energy, which may hinder postoperative recovery and wound healing (Aloysius *et al.,* 2023).

The incidence of trembling following regional anaesthesia for caesarean section (SC) is 85 percent (Subramani *et al.,* 2020). The incidence of these complications following epidural anaesthesia ranges between 30% and 33%. The incidence of trembling following spinal anaesthesia ranges between 50 and 80 percent. The incidence of Post Anaesthetic Shaking (PAS) in spinal anaesthesia patients ranges between 33 and 56.7 percent (Lirk and Berde, 2020). This is a very unfavourable situation for patients with impaired cardiovascular and pulmonary function, such as cardiac arrhythmia, heart failure, myocardial infarction, and hypertension, particularly elderly patients (Winarni, Amendoeira and Esparteiro, 2021). Therefore, preventing and managing postoperative hypothermia is crucial in optimizing patient recovery and reducing healthcare costs.

There are both non-pharmacological and pharmacological treatments for hypothermia. By preventing the redistribution process that causes hypothermia, non-pharmacological therapy techniques can be implemented (Lopez, 2018). Treatment for hypothermia depends on the severity of the condition; at temperatures between 32°C and 35°C, warm comforters are used as a passive external fitting method. At temperatures below 32°C, two methods are available: active external heating, which

involves placing a bottle of warm water on the patient's skin, immersing the patient in a water bath filled with warm water at 40°C, and providing a warm mattress and heating method (Kaczmarek and Nowakowski, 2016). Active internally through the administration of warmed intravenous fluids, warm gastric lavage, warm peritoneal lavage, warm colon lavage, warm mediastinal lavage, and warm oxygen (Petrone, Asensio and Marini, 2014).

A research found that electric blankets are effective in preventing hypothermia in post-c-section patients (Listiyanawati and Noriyanto, 2018). Similarly, a research conducted to see the efficacy of using electrified blankets in patients with postoperative hypothermia in the central surgical installation of the general hospital in the Palembang Bari region stated that it was effective in reducing hypothermia (Suswitha, 2019). In contrast, other studies have reported no significant benefit from electric blanket therapy (Majör, 2020). Although a number of interventions have been implemented to prevent perioperative hypothermia, the efficacy of electric blankets in this context remains a topic of interest and uncertainty. Existing research on the use of electric blankets in postoperative hypothermic patients is scant and frequently contradictory. Therefore, additional research is required to assess the efficacy of electric blankets as a treatment modality for postoperative hypothermia.

According to the initial survey conducted by the researchers in the operating room of the Dumai Hospital, eight out of ten caesarean section patients suffered from moderate hypothermia. It was discovered that 80% of postoperative patients in the central surgical installation of the Dumai City Hospital experienced hypothermia, especially SC patients, while in the recovery room, many patients experienced hypothermia, and routine treatment was administered using the available electric blankets, with the results demonstrating the ability to raise body temperature. Based on this, researchers were interested to find out the effectiveness of using electric blankets on increased body temperature in postoperative hypothermic patients at the Central Surgical Installation of the Dumai City Hospital in 2022.

METHOD

This study employed a quantitative research design utilizing a pre-experimental approach known as the "one-group pretest-posttest design." Given that a significant proportion of the patients in the study were surgical patients (SC patients), this design was chosen to assess the effectiveness of the intervention specifically for this patient population.

The population of this study consisted of 240 postoperative patients, and a sample size of 20 postoperative patients was selected using a non-probability sampling method known as "purposive sampling." The inclusion criteria for the study were patients who underwent surgical procedures (SC patients), while patients who underwent post-op laparotomy were excluded. The independent variable in this study was the use of an electric blanket, while the dependent variable measured was the body temperature of the participants. In November 2022, the study was conducted at Dumai Hospital Post-Surgical Room.

During the stage of preparation, the researchers obtained permission from Poltekkes Kemenkes Riau and Dumai Hospital. The researcher also obtained informed consent from the samples. In the implementation stage, the researchers conducted three steps. The initial step entailed measuring the body temperature of the sample immediately following the surgical procedure. This baseline measurement served to establish the samples' initial temperature before any intervention was administered. Following the baseline measurement, as the second step, the sample received an electric blanket therapy intervention. The participants were given electric blankets to aid in the maintenance of body temperature and prevent postoperative hypothermia. To assure consistency throughout the sample, the duration and settings of the electric blankets were standardized to 10-15 minutes (Adam *et al.*, 2022) The final step entailed re-measuring the participants' body temperatures following the intervention period. The purpose of this post-intervention evaluation was to determine the efficacy of the electric blanket therapy in enhancing the body temperature of postoperative hypothermic patients.

In this research, the data analysis involved both univariate and bivariate analyses. Univariate analysis was conducted to present the frequency distribution of all independent variables and the dependent variable, accompanied by an explanatory frequency distribution table. This analysis provided insights into the distribution and percentage of each variable under study. Bivariate analysis, on the other hand, utilized the Paired T-test to examine the relationship between the independent variable (electric blanket) and the dependent variable (body temperature). A significance level of alpha (= 0.01) was set, whereby if the p-value exceeded alpha, it was concluded that there was no significant relationship between the variables. Conversely, if the p-value was lower than alpha, the variables were deemed to have a statistically significant relationship.

It is important to note that other factors known to influence body temperature, such as room temperature and the type of surgery, were not treated as confounding variables in this study. This research has complied with ethical principles with the number LB.02.03/6/95/2022 by Poltekkes Kemenkes Riau.

RESULT

1. Univariate Analysis

In the graph below, research data according to univariate analysis are displayed.

Table 1. Frequency Distribution of Respondents

No.	Characteristics	frequency	percentage (%)
1.	Age:		
	a. Early Adult (26-35)	13	65,0
	b. Late Adult (36-44)	7	35,0
2.	Education:		
	a. JHS	2	10,0
	b. SHS	13	65,0
	c. Uni Students	5	25,0
3.	Occupation:		
	a. Housewife	5	25,0
	b. Civil Servant	1	5,0
	c. Private Employee	14	70,0
4.	Operation History		
	a. Yes	11	55,0
	b. No	9	45,0

source: Research Primary Data

Based on the data presented in Table 1, the findings indicate that a majority of the respondents in this study were early adults, comprising 13 individuals (65.0%) of the sample. Additionally, the majority of the respondents reported having a high school education, with 13 individuals (65.0%) falling into this category. Moreover, a significant proportion of the respondents, specifically 14 individuals (70.0%), were employed in the private sector. Furthermore, a notable number of participants, specifically 11 individuals (55.0%), reported a history of previous surgeries. These findings highlight important demographic and background characteristics of the respondents in this study.

2. Bivariate Analysis

Using bivariate analysis, each independent variable was correlated with the dependent variable. The outcomes of data processing are displayed in the following table:

Table 2. Frequency Distribution of Respondents

Variable	Mean	SD	P Value	N
Pretest	35,47	0,219	0.000	20
Posttest	36,26	0,247		

Twenty samples' average body temperature rose from 35.47 degrees Fahrenheit (pre-test) to 36.26 degrees Fahrenheit (post-test) after receiving an electric blanket, as shown in the preceding table. While the pre-test standard deviation is 0.219, the post-test standard deviation is 0.247. The statistical test revealed that the p value = 0.000 was less than the alpha value (p 0.05), indicating that the use of electric comforters was effective in reducing postoperative patients' body temperature.

DISCUSSION

Age Factors

Age is a critical factor that influences body temperature regulation. The hormonal mechanisms associated with age directly impact the body's metabolism, which, in turn, affects body temperature (Kim and Choe, 2019). This connection is particularly evident in neonates and infants, where a unique mechanism known as non-shivering

thermogenesis takes place. In this process, brown fat metabolism generates heat without shivering, significantly increasing metabolism by over 100% (Fischer, Cannon and Nedergaard, 2020). The abundance of brown fat in neonates serves as a crucial mechanism to prevent hypothermia in this age group (Smith, Suanda and Yu, 2014).

On the other hand, in adults, heat regulation is relatively stable, primarily governed by the hypothalamus (Lunze and Hamer, 2012). Located in the brain's central region, the hypothalamus plays a vital role in maintaining core body temperature. When the environmental temperature is comfortable and aligns with the body's set point, the hypothalamus responds minimally, resulting in mild and consistent temperature variations. The relationship between heat production and loss is tightly regulated through neurological and cardiovascular mechanisms. The anterior hypothalamus controls heat loss, while the hypothalamus as a whole governs heat production (Szymusiak, 2018). Any decrease in body temperature occurs when nerve cells in the anterior hypothalamus become cooler than the set point.

Therefore, understanding the influence of age on body temperature regulation is crucial, as it helps us recognize the unique thermoregulatory challenges faced by different age groups. By considering age-related factors and mechanisms, such as non-shivering thermogenesis in neonates and the stable heat regulation in adults, we can better comprehend the dynamics of body temperature control across various stages of life.

The result told that the majority of the samples reported having a high school education. Individuals with a higher education level may have better health literacy and awareness of the importance of maintaining optimal body temperature (Kesic *et al.,* 2022). This increased knowledge could lead to more proactive behaviours, such as seeking medical advice or adopting lifestyle practices that promote body temperature regulation. Education can influence individuals' understanding of self-care practices, including the importance of maintaining optimal body temperature (Matthie, Jenerette and McMillan, 2015). Those with higher education levels may be more likely to engage in self-care behaviours, such as dressing appropriately for weather conditions or using temperature-regulating devices, which can impact their body temperature.

Occupation Factors

Based on the result of this study, the majority of samples were people from private employee. The relationship between body temperature and occupation within the private sector or among employees can be influenced by several factors. The work environment in the private sector can vary significantly across industries and job roles (Hasan, Jawaad and Butt, 2021). Some private sector jobs involve working in temperature-controlled office settings, while others may require exposure to outdoor or physically demanding environments. The work environment can impact body temperature regulation by influencing the ambient temperature and the level of physical activity required. In addition, occupational stress, common in the private sector, can have an impact on body temperature regulation. Stressful work conditions can activate the body's stress response, leading to physiological changes, including an increase in body temperature (Slominski *et al.,* 2013). Additionally, chronic stress or mental health issues associated with work can disrupt the body's thermoregulatory mechanisms.

Operation History

The findings of this study revealed that 11 individuals (55.0%) had a history of previous surgeries. It is important to note that undergoing surgery can have a significant impact on a person's anxiety levels (Maharani *et al.,* 2018). The response to anxiety can vary among individuals, ranging from adaptive to maladaptive responses. In adaptive responses, individuals exhibit a range of reactions that allow them to effectively cope with the anxiety they experience. For instance, anticipation is considered one of the most adaptive responses, where individuals are prepared and able to adapt to the anxiety they may encounter. This adaptive response enables individuals to manage their anxiety levels and maintain a sense of control (Meichenbaum, 2017).

Conversely, maladaptive responses to anxiety can lead to more severe manifestations. Panic represents the most maladaptive range of responses, where individuals struggle to effectively respond to the anxiety they face. This can result in various physical, behavioural, and cognitive disturbances, indicating a higher level of anxiety (Shafia *et al.,* 2017). The level of anxiety experienced by an individual can

be influenced by their adaptive or maladaptive response patterns. Those who respond adaptively tend to experience milder levels of anxiety, while those with maladaptive responses may experience more severe anxiety symptoms (Carlson *et al.,* 2015). It is worth noting that the relationship between previous surgery history and anxiety levels is complex, and individual experiences can vary.

Pretest-Postest Result

This study revealed that the average increase in body temperature before (pre-test) and after (post-test) receiving an electric blanket was 35.47 and 36.26, respectively. Indicating that the use of electric blankets effectively raised postoperative body temperature. This study's findings are consistent with those who discovered an average increase in body temperature before and after using an electric blanket (Listiyanawati and Noriyanto, 2018). Similarly, research on the efficacy of using electric blankets in patients with postoperative hypothermia in the central surgical installation of the general hospital in the Palembang Bari region revealed that the average time needed to reach a normal temperature in the intervention group with an electric blanket was 15.9 minutes (95% confidence interval [CI]: 14.89-16.01), with a standard deviation of 1.5 minutes. In the control group, the average time required to return to normal body temperature was 26.7 minutes (95% confidence interval: 25.77-27.07) (Suswitha, 2019).

The postoperative warming intervention effect results in an increase in body temperature and an increase in the thermal compartment's energy content. This is essential because overcoming hypothermia in anesthetized patients is difficult. It is known that anaesthesia can block the hypothalamic temperature regulation reflex. So that the process of core-to-periphery warming does not occur, and the body even experiences vasoconstriction (Jensen *et al.,* 2018).

Using conventional blankets will increase the patient's skin's ambient temperature. A standard blanket can prevent the patient's body from losing heat. The disadvantage of standard blankets is their inability to maintain body heat for extended periods (Arora *et al.,* 2022). Therefore, it is recommended to provide warm comforters to surgical patients in order to combat hypothermia. However, despite the fact that there are distinctions between the use of ordinary blankets and electric

blankets to treat hypothermia in post-operative patients, both interventions can speed up the body's temperature rise. Individual suffering from hypothermia. These two interventions prevent re-exposure of the epidermis to cold temperatures, thereby preventing the loss of body heat (Mays, Molins and Nelson, 2019).

CONCLUSION

This study investigated the efficacy of electric blankets in increasing postoperative body temperature in patients at the Central Surgical Installation of Dumai City Hospital. The findings revealed that a sizeable proportion of respondents were young adults with a high school diploma who worked in the private sector and had undergone prior surgical procedures.

In addition, the study demonstrated that the use of electric comforters effectively raised postoperative patients' body temperature. The p-value of 0.000 demonstrates that the average body temperature was 35.47 degrees Celsius before the intervention and 36.26 degrees Celsius after the intervention.

These findings suggest that the use of electric blankets may be an effective intervention for preventing postoperative hypothermia in patients, particularly those with a history of previous surgical procedures. Maintaining optimal body temperature is essential for facilitating a speedier recovery, minimizing complications, and enhancing patient outcomes.

On the basis of the findings, several recommendations can be made. First, healthcare professionals should consider the use of electric blankets as part of the postoperative care protocol for patients, particularly those who are at a higher risk of hypothermia due to prior surgical procedures. Second, additional research should investigate the long-term effects and cost-effectiveness of electric blanket use in various healthcare settings. In addition, healthcare institutions should provide appropriate education and training to their employees regarding the implementation and monitoring of electric blanket interventions.

In conclusion, the findings of this study emphasize the significance of using electric blankets to increase postoperative body temperature and provide valuable insights for enhancing patient care and surgical outcomes.

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