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The Effectiveness of Giving Warm Blankets Against the Incidence of Shivering in Sectio Caesarea Patients with Spinal Anesthesia

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KEYWORDS
Warm Blanket, Shiver, and Cesarean Section

ABSTRACT
SC action with spinal anesthesia who experienced shivering during *surgery and before spinal anesthesia as much as 19.67% experienced shivering* during postoperative in the postoperative recovery room. The purpose of the study was to analyze the effectiveness of giving warm blankets to the incidence of shivering in spinal cesarean sectio patients. The respondents in this study were patients who underwent SC surgery with spinal anesthesia at RS X in September 2023-February 2024 as many as 60 respondents with a control group of 30 respondents and intervention of 30 respondents. This research is a type of *Quasy Experiment, two group pre and post-test design with* dependent and independent t test *analysis tests*.The results of the study found that most of the ages were 25-35 years with a maternal weight of <60-80kg. The degree of shivering was *pre-test* 1: 1st degree (53.3%), 1st minute post-test was 0 degrees (50.0%) and 45th minute post-test 0 degree 0 increased (86.7%). There was a difference in the incidence of chills before and after the use of warm blankets in the intervention group (pvalue: 0.000) with t values: 6,924 A and the effectiveness of giving warm blankets to reduce chills in *patients* with spinal anesthesia during intraoperative and postoperative while in the recovery room at RS X Bekasi on Pre-post intervention Pvalue:0.000. The need to provide education related to environmental temperature conditions in the operating room, side effects of spinal anesthesia and nurse handling of the incidence of shivering in post-SC patients with spinal anesthesia and facilitate warmer machine heating devices for patients in the operating room, especially patients with SC surgery with spinal anesthesia.

1. INTRODUCTION

Partus or in other words the birth process will definitely be experienced by all women or mothers who are in pregnancy, the partus or childbirth process that will be experienced by women or mothers who are in pregnancy can go through 2 ways, the first is the process of giving birth in a natural way or commonly called normal partus and the second by surgery or *surgery Sectio Caesarea* (SC), *Sectio Caesarea* (SC) surgery is one of the most frequently performed surgeries.and it has become a routine procedure with very low morbidity and mortality (Schuller &; Surbek, 2014). Cephalo-pelvic disproportion, cervical dystocia, malpresentation, premature birth, macrosomia, insufficiency, placenta, placenta previa, or fetal distress are problems addressed with SC, which can reduce perinatal morbidity and maternal and child mortality (Schuller &; Surbek, 2014).

Data from WHO (2015) the average sectio caesarea in developing countries is around 5-15%

per 1000 births. Bijalmiah (2018), said that SC continues to increase worldwide, especially in middle and high-income countries including Australia (32%), Brazil (54%), and Colombia (43%). This is supported by Corso, et al (2017) who stated that SC is one of the increasing prevalence events in the world. The number of SC deliveries in Indonesia reaches around 30-80% of the total deliveries. Based on data from the Ministry of Health (2017), the incidence of SC in Indonesia according to national survey data is approximately 1,200,000 out of approximately 5,690,000 deliveries or about 24.8% of all deliveries. Based on statistical data Riskesdas (2018) shows the birth of SC surgery in Indonesia is 9.8% with the highest proportion in DKI Jakarta at 19.9% and in Central Java at 10.0%. According to a BKKBN survey (2017) there are 17.0% of SC deliveries that occur in Indonesia with various labor backgrounds. While SC surgery in Indonesia is only carried out on the basis of certain medical indications and pregnancies with complications. In hospitals throughout Indonesia, the percentage of SC incidence each year has not changed much. Teaching or referral hospitals have *a sectio caesarea rate of* 20% and private hospitals 15%, according to the Ministry of Health of the Republic of Indonesia (Ministry of Health, 2013).

SC is a surgical procedure that causes pain because it breaks body tissue, therefore anesthesia is needed to lower the pain threshold during surgery. Relieving pain during surgery is known as anesthesia (Morgan et al., 2011). One of the methods used to provide analgesia to patients during and after surgery is regional anesthesia. Regional analgesic techniques are used both at the prehospital level and in the Emergency Department. Spinal anesthesia, one of the most common regional methods of anesthesia, is used extensively in the lower abdomen. It was chosen because it is safer, easier, and cheaper, and because the anesthetic effect starts faster (Morgan et al., 2011).

According to Ysauqi et al, (2019), said that a side effect of using spinal anesthesia techniques is impaired *thermoregulatory* function, namely decreasing the *vasoconstriction threshold*. This happens because spinal anesthesia creates sympathetic blocks, muscle relaxation, and sensory blocks against peripheral temperature receptors, which inhibit the temperature compensation response. The condition causes a shivering reaction. *Post Anestestetic Shivering* (PAS), which is one of the side effects that potentially occur after spinal anesthesia which can increase the patient's pain level and disturb the patient due to cold which can increase pain caused by muscle contractions in the surgical area, this is a clinical result caused by PAS. Anesthesia can impair *thermoregulation control,* resulting in *morbidities* such as shivering and *hypothermia*. Such stress not only increases the risk of blood loss and wound infection but also leads to further complications during the postoperative period.

SC surgery can cause physiological changes in the body such as a decrease in body temperature or *hypnomy* (Brunner &; Suddarth, 2009). *Hypothermia* and chills are unwanted morbidities that often occur during *cesarean sections*. Although some heating strategies are active, such as the use of forced air, mattresses, and liquid heating (Chen et al., 2019). The body's compensation mechanism produced by spinal anesthesia can cause chills in SC patients. This is a common condition that is often encountered by patients and can have an impact on patients who are not good and uncomfortable to patients (Kusumasari et al., 2013). According to *National Institute for Health and Care Excellence* (NICE) guidelines, *involuntary perioperative*

hypothermia is defined as a core temperature of less than 36.0°C, and NICE CG65 guidelines provide a good overview of heating for surgery. *Hypnomy* and chills are undesirable conditions that often occur during SC surgery, although some strategies with active heating such as the use of warm air, heating mattresses and warm intravenous fluids can reduce these side effects (Chen, et al 2019). Perioperative hypothermia with spinal anesthesia has a different etiology, but is mostly caused because spinal anesthesia alters thermoregulation and reduces the threshold for *vasoconstriction* and wheezing. Spinal anesthesia causes *thermoregulation vaso controller* constriction below the level *of sensory blockade* leading to heat loss by redistribution of heat from the center of *thermoregulation* to *the periphery,* redistribution of heat from the center of thermoregulation to the periphery is difficult to treat, but must be prevented by preheating the peripheral regions of the body (Zhou et al., 2020).

The occurrence of shivering itself can occur due to the influence of anesthetic drugs, postoperative pain, *operative hypothermy, hypoxia,* the presence of *pyrogens*, early recovery from the effects of spinal anesthesia and *over-sympathetic activity*. Patients feel discomfort during this shivering because the body will adapt to the condition by increasing metabolism by 200% to 500%, increase oxygen consumption significantly to 400%, increase carbon dioxide production, increase hypoxemia 2 arteries, increase in *intraocular* pressure and *intracranial* pressure, lactic acidosis, can cause *electrocardium interference* and increased pain after surgery due to wound traction and pain after surgery due to surgical wound pulling (Prasetyo et, al., 2017). The number of shivering events that occur after spinal anesthesia ranges between 305 and 33% (Lopea, 2018). In patients who have undergone surgery, the incidence rate of *post shivering anesthesia* (PAS) is around 33% to 56.7% (Mashitoh et al., 2018). The Sleman Hospital study found that of the 44 people surveyed, 25 (or 56.8%) experienced chills (Linasih et al., 2018).

Research conducted by Prasetyo et al., (2017) explained that the incidence of shivering in patients with spinal anesthesia was said to occur between 37%-57% based on research conducted at Karawang Hospital in 2014 (Irawan, 2018). Risk factors for anesthesia in shivering patients include length of surgery, ASA physical condition, age, sex, nutritional atatus, and low body mass index (Susilowati et al., 2017). *Perioperative hypothermia* is a frequent and reported side effect *of regional anesthesia* and can affect up to 60% of patients undergoing SC surgery under spinal anesthesia. *Hypothermia* can cause many complications including postoperative wound infection, increased blood loss and transfusion requirements, *myocardial ischemia*, high risk of *coagulopathy*, chills, increased hospitalization and patient discomfort, maternal temperature can also affect body temperature outcomes in *neonatal* or newborn infants and the influence of APGAR score in the baby.

According to Zhou et al., 2020, by providing warm blankets and warm *intravenous fluids* 30 minutes before surgery was able to reduce the core area of temperature drops, decrease the incidence of preoperative hypothermia and chills, and increase maternal comfort in patients undergoing sc surgery. The incidence of shivering and *hypothermia* related to anesthesia during SC surgery can be reduced by using various techniques both by providing warm blankets and by using a heating mattress can be used to prevent the occurrence of *hypothermia* in mothers who are undergoing SC surgery, by

heating patients, can improve the quality of SC surgery. Actively providing warm blankets can also improve the quality of SC operations through reduced shivering and *hypothermia* (Chen et al., 2019). Warm fluid therapy and warming blankets have been shown to be more effective in raising body temperature to normal than warming blankets in the treatment of chills caused by *hypothermia* in postoperative patients under spinal anesthesia. According to (Qonaah et al. 2019). According to Zhou et al, 2019, said that warmer with air during preoperative combined with warm intravenous fluids in perioperative can prevent hypothermia in the mother, reduce chills in the mother and increase maternal thermal comfort in patients undergoing SC surgery with spinal anesthesia.

In the period December 2022 – February 2023, the total number of surgeries at RS X Bekasi was 314 procedures, 61 cases (19.43%) were SC procedures with spinal anesthesia, and 46 cases (75.4%) experienced *shivering* during surgery and before spinal anesthesia and 12 cases (19.67%) experienced shivering during postoperative in the postoperative recovery room, in this period patients who experienced postoperative shivering events said and complain of discomfort due to chills, according to the implementation of giving warm blankets to SC patients with spinal anesthesia, namely warm blankets will be used during the surgical process by providing warm blankets in areas that are not operated on and providing warm blankets in the postoperative recovery room. Therefore, the authors are interested in the effectiveness of using *blanket warmers* used during surgery and before surgery to reduce the incidence of *shivering* (chills) in sectio caesarea (SC) patients with spinal anesthesia.

2. METHOD

This research is *quasi-experimental* with the design of *Group Pretest Posttest Design* with a quantitative approach. In this study, there will be an intervention group using warm blankets in the post-op recovery room from the start and a control group using warm blankets 15 minutes after in the recovery room. *After that, researchers assessed* the incidence of shivering experienced in post-SC patients with spinal anesthesia. The study population was mothers who underwent *Sectio Secarea* (SC) surgery with the risk of experiencing symptoms of chills at RS X Bekasi with spinal anesthesia in the operating room from September 2023 to February 2024 as many as 60 patients. The study sample used a total sampling sample, namely all clients who underwent SC surgery in the period starting from September 2023 to February 2024 as many as 60 respondents divided into 2 groups, namely 30 intervention groups and 30 control groups. This study was conducted in the surgical room of RS X Bekasi, where researchers collected data on patients undergoing Sectio Cesarea (SC) surgery with spinal anesthesia. This data was collected in the operating room of RS X Bekasi from September 2023 to February 2024. The statistical analysis used is a paired difference test with a paired difference test, parametric is a T test, paired t-test is one hypothesis testing method where the data used is not free (paired).

3. RESULT AND DISCUSSION

Univariate Analysis

a. Characteristic

Table. 1
Distribution of maternal frequency based on age, and weight in postoperative SC mothers under spinal anesthesia.

Variable	Group			
	Intervention		Control	
	n	%	n	%
Age				
<25 years	2	6.7	2	6.7
25-35 years	**26**	**86.7**	**25**	**83.3**
36-45 years	2	6.7	3	10.0
Weight				
<60 - 80kg	**20**	**66.7**	**18**	**60.0**
81 - 100kg	9	30.0	11	36.7
> 100kg	1	3.3	1	3.3
	30	**100**	**30**	**100**
(*Source:* Data processed, 2024)				
(*Source:* Processed Data, 20				

Based on table 1, it shows the largest percentage of postoperative SC mothers with spinal anesthesia in the intervention group, namely 25-35 years, as many as 26 respondents (86.7%), while in the control group as many as 25 respondents (83.3%). The mother's body weight was less than 60 to 80kg in the intervention group as many as 20 respondents (66.7%) and the control group as many as 18 respondents (60.0%).

Research conducted by Ni, Zhou, & Zhou (2020), where the dominant age of 25-35 years is 75.7% and maternal weight is less than 60 to 80kg as much as 87.66%. Research conducted by Qona'ah, Rosuliana, Bratasena & Made (2019), most respondents in the study, namely more than 35 years old as much as 89.8% and the weight of pregnant women more than 60 kg as much as 83.9%.

Table 2

Distribution of degrees of shivering in post-SC mothers with spinal before and after treatment on Intervention & Control Group

Chills	Intervention						Control					
	Pre-test		*1st minute*		*45th minute*		*Pre-test*		*15th minute*		*45th minute*	
	n	%	N	%	n	%	n	%	N	%	n	%
Degree 0	7	23.3	**15**	**50.0**	**26**	**86.7**	5	16.7	**18**	**60.0**	**27**	**90.0**
Degree 1	**16**	**53.3**	12	40.0	4	13.3	**16**	**53.3**	11	36.7	3	10.0
2nd												

degree	6	20.0	3	10.0	0	0.0	8	26.7	1	3.3	0	0.0
3rd degree	1	3.3	0	0,0	0	0.0	1	3.3	0	0,0	0	0.0
Degree 4	0	0,0	0	0,0	0	0.0	0	0.0	0	0,0	0	0.0
Total	**30**	**100.0**	**30**	**100.0**	**30**	**100.0**	**30**	**100.0**	**30**	**100.0**	**30**	**100.0**

(***Source**:* Data processed, 2024)

Table 2 shows the frequency distribution of the Degree of Shivering in post-SC mothers with spinal before and after treatment in the intervention group with 3 measurements (1 pre-test and 2 post-test) with the results of the pre-test mostly 1st degree namely 16 respondents (53.3%) while in the 1st minute post test most of the 0 degrees (50.0%) and the 45th minute post test 0 degrees increased to 26 respondents (86.7%). In the control group, there was the same improvement after being given warm blankets at minutes 15 and 45. Based on the above data, it was seen that there was a decrease in the degree of shivering in post-SC mothers with spinal before and after treatment in the intervention & control group, it is assumed that since all patients were given warm blankets, both control and intervention only as a differentiator if control began at minute 15 and intervention began at minute 1.

Research conducted by Ni, Zhou & Zhou (2020) on *"Effects of combined warmed preoperative forced-air and warmed perioperative intravenous fluids on maternal temperature during cesarean section"* obtained results in the intervention group (36.2 ± 0.4 °C) compared to the control group (35.5 ± 0.3 °C) with a percentage of shivering incidence of 56.3% in the control group and 19.1% in the intervention group during surgical procedures. Backed by research that conducted Qona'ah, A., Rosuliana, N. E., Bratasena, A., &; Made, I. (2019) on "*Management of shivering in post-spinal anesthesia using warming blankets and warm fluid therapy*" with the results of the intervention group given warm fluids and warming blankets with a Mean value of 35.370C and body temperature after intervention was 35.550C in the 15th minute get a temperature of 35.790C in the 30th minute get a temperature of 36.060C in the 45th minute with a temperature of 36.170C until minutes 60th minute stable temperature 36,180C.

Patients who performed SC with spinal anesthesia, reported as many as 75.4% experienced *shivering* during surgery and before spinal anesthesia and 19.67% experienced chills during postoperative in the postoperative recovery room, in this period patients who experienced postoperative shivering events said and complained of discomfort due to chills, according to the implementation of giving warm blankets to SC patients with spinal Anesthesia, which is a warm blanket will be used during the surgical process by providing a warm blanket in the area that is not operated on and providing a warm blanket in the postoperative recovery room. The physiological response of the body affects the normal temperature of humans, which ranges between 36.5 and 37.5 degrees Celsius in the environment. The regulatory system is regulated to maintain body temperature within normal physiological and metabolic limits in a homeothermic state. Anesthesia can disrupt physiological processes and thermoregulatory functions while

eliminating adaptation mechanisms (Hubbard, 2014).

1. **Bivariate Analysis**
   Test the difference in the incidence of shivering

Table 3
Analysis of Differences in the Incidence of Shivering Before and After Blanket Use in the Intervention Group and Control Group

Group	Degree of Shivering	n	*Mean*	SD	*T*	*P Value*
Intervention	*Pre-post test 1*	30	0.433	0.568	4.176	0.000*
	Pre-post test 45		0.900	0.711	6.924	0.000*
Control	*Pre-post test 15*	30	0.733	0.520	7.712	0.003*
	Pre-post test 45		1.066	0.691	8.449	0.000*

Table 3 shows an analysis of the difference in the incidence of chills before and after the use of warm blankets in *the pre &; post* in the intervention group obtained a mean value of 0.433 SD: 0.568 & (pvalue: 0.000) means that there is a difference in the incidence of chills before and after the use of warm blankets in the intervention group. Value t: 6.924 which means that giving a warm blanket intervention can increase the degree of shivering by 6.92 times or 69.24% compared to not given the intervention. While the control group had the same difference (pvalue: 0.003 in the pre-test and 0.000 in the post-test). This proves that giving warm blankets in minutes 1-45 gives a positive difference to post-SC mothers. In the test results before and after (Intervention 6.942-4.176=2.748 means reducing the incidence of shivering on average by 27.48%, while the control group 8.449-7.712= 0.737 means only 7.37% decrease in the incidence of shivering in the control group)

This study is in line with research conducted by Syahrizal, H. (2020) on "The Effectiveness of *Blanket Warmer* on *Shivering Treatment* in Post Sectio Caesarea (SC) Patients with Spinal Anesthesia" with the results that patients who received post-Sectio *Caesarea* (SC) spinal anesthesia showed that the use of blanket warmet was very effective in overcoming shivering with a p value: 0.000. In line with research conducted by Ni, T. T., Zhou, Z. F., He, B., &; Zhou, Q. H. (2020) on *"Effects of combined warmed preoperative forced-air and warmed perioperative intravenous fluids on maternal temperature during cesarean section"* results were obtained in the intervention group (36.2 ± 0.4 °C) compared to the control group (35.5 ± 0.3 °C) with a value of P = 0.0007. The incidence of shivering was 56.3% in the control group and 19.1% in the intervention group during the surgical procedure (P<0.0001), and shivering scores were higher in the control than in the intervention group.

Shivering occurs if the temperature in the preoptic region of the hypothalamus is lower than the surface temperature of the body, The *effrent tremor pathway* originates in the posterior hypothalamus and continues to the anterior midbrain tract, The increase in tone that occurs in tremor arises due to changes in neurons that occur in the area of the mesial reticular formation, bilateral pons, and spinal cord, Synchronization of motor movements that occur at the time of tremor is caused by inhibition i*ntermiten* in *Renshaw cells* (Bhattacharya, 2013). The shivering motor center is located near the heat-sensitive preoptic area in the anterior hypothalamus. Hypothermia will occur in patients who undergo surgery due to a combination of exposure to low ambient temperatures and impaired thermoregulation caused by anesthesia. During the first hour of anesthesia, heat can be distributed from the core of the body to the periphery, lowering the temperature by about 0.5–1.5 °C. According to Dugdale (2018), this occurs due to the processes of radiation, convection, conduction, and evaporation, which in turn divert heat from the core of the body to the periphery. The metabolic rate decreases, resulting in a decrease in body heat production (Ihn et al., 2018).

The researchers' assumption in the study was that there was a significant difference between body temperature before and after giving warm blankets to all groups in both intervention (Pvalue: 0.000) and control (Pvalue: 0.003). Giving warm blankets at minutes 1-45 made a positive difference in post-SC mothers in all intervention and control groups. There is a significant difference between giving warm blankets starting from 1 minute or 15 minutes, but it is distinguished by the time and duration of giving warm blankets which greatly affect the increase in body temperature so that the incidence of shivering is lower. The sooner a warm blanket is given, the incidence of shivering will be lower, and vice versa if a warm blanket is given with a certain period of time, the incidence of shivering will be higher.

a. The effectiveness of giving warm blankets to reduce chills in patients *with spinal anesthesia during intraoperative and postoperative while in the recovery room at* RS X Bekasi

Table 4
Analysis of the Effectiveness of Giving Warm Blankets to Reduce Shivering in *Sectio Caesarea* Patients with Spinal Anesthesia During Intraoperative and Postoperative at RS X Bekasi (N=60)

Variable	Mean	ONE	N	T	Pvalue
Pre-post Control	**1.066**	**0.14726**	**60**	**7.243**	**0,013***
Pre-post Intervention	**0.90**	**0.15325**		**5.873**	**0,000***

(***Source**:* Data processed, 2024)

Based on table 5.4 shows that the results of the analysis test of the effectiveness of giving warm blankets to reduce chills in patients with spinal caesarea with spinal anesthesia during intraoperative and postoperative while in the recovery room at RS X Bekasi in the pre&post control group Pvalue: 0.013<α (0.05) while pre-post intervention pvalue: 0.000<α (0.05). Based on these values, it proves that there is an effectiveness of giving warm blankets to reduce

chills in patients with spinal caesarea with spinal anesthesia during intraoperative and postoperative while in the recovery room at RS X Bekasi.

According to Zhou et al (2020) and Qona'ah et al (2019) stated that providing a warm blanket for 30 minutes before surgery was able to reduce the core area of temperature drops, decrease the incidence of preoperative hypothermia and chills, and increase maternal comfort in patients undergoing SC surgery with spinal anesthesia. The results of this study are in line with Jun et al. (2019) on "Efficacy of forced-air warming and warmed intravenous fluid for prevention of hypothermia and shivering during caesarean delivery under spinal anaesthesia" obtained pvalue: 0.000. His research shows that a combination of giving warm air, fluids, and warm blankets can be a better strategy for reducing shivering than other strategies. Although with insignificant results (Pvalue: 0.000).

The researchers' assumption is that the administration of warm blankets is effective for reducing chills in SC patients under spinal anesthesia during intraoperative and postoperative while in the recovery room. This is because the characteristics in this study are the age of 25-35 years (86.7%) and the mother's weight is 60 to 80kg (66.7%). This is in accordance with the theory developed by Harahap (2014) that at the age of 25-35 years is adulthood, where the incidence of shivering is strongly influenced by age due to anatomy, physiology, and the ability to control different temperatures in each age group. Harahap (2014), when compared to younger patients, general anesthesia can cause greater changes in thermoregulatory thresholds in older patients. In accordance with Lie's theory, et al (2020) explain that changes in cardiovascular function (stiffness in the arterial vascular wall area, increased peripheral vascular resistance, and also decreased cardiac output), lung organ stiffness, and weakness of respiratory muscles cause poor ventilation, diffusion, and oxygenation can increase the incidence of shivering. Body weight 60-80 Kg is the ideal body weight in pregnant women. In accordance with the theory of Buggy and Crossley (2018) in Lie, et al (2020) explain that gilming is very closely related to weight. Fatty tissue, which is very rich in investment in the parasympathetic system and vascularity. In people with a low body mass index it is very easy to lose heat, which is one of the causes of hypothermy that can cause shivering in intrasurgery, because the body's thin fat source serves as an energy reserve. Conversely, people with a high body mass index have a good heat protection system and a source of heat-producing energy, that is, fat, because of thick fat, so a high body mass index has a much better heat protection system

4. CONCLUSION

The study found that the majority of post-cesarean section (SC) mothers with spinal anesthesia in both the intervention and control groups were aged between 25–35 years, with 86.7% in the intervention group and 83.3% in the control group. Most participants also had a body weight of 60–80 kg, with 66.7% in the intervention group and 60.0% in the control group. In terms of the frequency distribution of shivering, measured at three points (pre-test, post-test at minute 1, and post-test at minute 45), the results showed a significant improvement in the intervention group. The initial pre-test recorded the highest frequency at degree 1 (53.3%), while in the first post-test (minute 1), degree 0 was reported in 50.0% of the cases, which increased to 86.7% by minute 45. A similar improvement trend was also observed in the

control group after the application of a warm blanket at minutes 15 and 45. Statistical analysis revealed a significant difference in the incidence of shivering before and after the warm blanket intervention in the intervention group, with a p-value of 0.000 and a t-value of 6.924, indicating that the intervention increased the likelihood of reducing shivering by 6.92 times or 69.24% compared to no intervention. Moreover, the effectiveness analysis of warm blanket use to reduce chills during intraoperative and postoperative periods in the recovery room at RS X Bekasi showed a significant difference with a p-value of 0.013 in the control group and 0.000 in the intervention group.

Based on these findings, several suggestions are proposed. For patients, it is essential to provide education about the operating room's environmental temperature, potential side effects of spinal anesthesia, and the role of nurses in managing postoperative shivering. For hospital services, it is necessary to equip operating and recovery rooms with warming devices such as warmer machines, especially for SC patients under spinal anesthesia. Educational institutions are encouraged to use the results of this study as reference material for future research and to enrich lecture content in nursing education. Lastly, for researchers, this study can serve as a foundation for further exploration in anesthesia nursing care, particularly in managing postoperative complications such as shivering in SC patients undergoing spinal anesthesia.

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