



Factor Analysis of the Incident of Chills in Sectio Caesarea Patients with Spinal Anesthesia in Hospital

Israeli¹, Sri Wahyuni², Khumaidi Arief³, Meilany Laisouw⁴, Ratna Malawat⁵, Anis Laela Megasari⁶

¹ Program Study Nursing, Mandala Waluya University, Indonesia

² Programs Nursing Studies, Sandi Karsa Polytechnic Makassar, Indonesia

³ Nursing Study Program, STIKes Yapika, Indonesia

^{4,5} Midwifery Study Program, Poltekkes Kemenkes Maluku, Indonesia

⁶ Bachelor of Applied Anesthesiology Nursing Study Program, Vocational School, Universitas Sebelas Maret, Indonesia

ABSTRACT

Spinal anesthesia is a regional anesthetic technique that is produced by blocking the spinal nerves in the subarachnoid space with local anesthetic substances. The spinal anesthesia technique is widely used because it is a simple, effective technique, relatively safe for the nervous system, a strong level of analgesia, the patient remains conscious, sufficient muscle relaxation, less surgical wound bleeding, less risk of aspiration, and faster recovery of digestive tract function. In the intra- or post-operative stage, patients with spinal anesthesia often complain of nausea, vomiting, a feeling of heaviness in both lower extremities, and shivering which occurs due to the secondary effects of spinal analgesic drugs which produce sympathetic block, muscle relaxation, and sensory block of peripheral temperature receptors, thereby inhibiting the response. temperature compensation. The aim of this study was to determine the factors that cause shivering in intra spinal anesthesia patients at Aliya Kendari Sj Hospital. This research method is an analytical observational study with a cross sectional approach using a random sampling technique to obtain the number of caesarean section patients. The analysis used is Logistic Regression. The research results showed a significant relationship between operation time, operating room temperature, LILA. The conclusion is that the most dominant factor influencing the incidence of shivering is body temperature.

Keywords: Factor Analysis, Incident of Chills, Sectio Caesarea Patients, Spinal Anesthesia

Correspondent : Israeli

E-mail : israelimwkd@gmail.com





1. Introduction

Shivering is involuntary and repetitive muscle activity of one or more skeletal muscles which usually occurs in the early post-anesthesia recovery period. Shivering causes discomfort for the patient, this causes an increase in metabolic rate to more than 400%, and increases the intensity of pain in the wound area due to pulling on the surgical wound (Morgan et al, 2013). Patients with shivering must receive close monitoring, especially regarding oxygenation and hemodynamics. However, according to Gangopadhyay et al (2010), the incidence of shivering can be anticipated and controlled by providing warm blankets, using warming water and warmed fluids, and can also be maintained by maintaining the operating room temperature between 24-26°C.

The incidence of Post Anesthetic Shivering (PAS) in patients undergoing spinal anesthesia is around 33-56.7 % (Sarrim and Budiono, 2011). Post-anesthesia shivering can occur due to several factors, including exposure to cold environmental temperatures, ASA physical status, age, nutritional status and low body mass index, gender, duration of surgery and amount of bleeding. Bleeding results in compensatory physiological changes such as tachycardia, vasoconstriction, and activation of cytokines and hormones, as well as a clotting cascade to maintain ongoing blood volume loss. The blood clotting cascade is influenced by vasculature, thirteen factors in the human body, and platelets. Platelets facilitate the blood clotting cascade which is active when bleeding or injury occurs as a normal response of the body (Makroo, Walia, Bhatia, and Gupta, 2011).

To overcome the incidence of postoperative hypothermia, in the recovery room the patient must be given oxygen, intravenous heating elements, heating blankets and wool hats. Intravenous warming elements or warm fluid therapy are warming elements that are given intravenously through intravenous fluids, where this action is carried out to reduce heat output and avoid iatrogenic cooling in the body by warming intravenous fluids to a temperature of 37.0 C. Many people find it difficult to understand that in





patients hypothermia, giving fluids at room temperature will cool the patients (Nayoko et al, 2016).

The type of anesthesia recommended for caesarean section is the spinal anesthesia technique. This is because spinal anesthesia is the safest anesthesia technique considering the condition of the mother and fetus (Palanisamy et al, 2022).

Shivering or shivering is a complication that often occurs in caesarean section delivery patients with spinal anesthesia (Liu et al, 2019). Patients who experience shivering will experience involuntary repetitive muscle movements (Tilahun et. al, 2020). Shivering causes an uncomfortable condition in the patient, this results in an increase in metabolism to > 400% and an increase in the intensity of pain in the surgical incision area (Morgan et al, 2013). can also cause a significant increase in oxygen consumption (up to 400%), increased CO₂ production (hypercarbia), increase arterial hypoxemia, lactic acidosis, and can cause heart rhythm disturbances (Masitoh, 2018).

According to Masitoh (2018), the incidence of Post Anesthetic Shivering (PAS) in patients undergoing spinal anesthesia is around 33-56.7% (Sarrim and Budiono, 2011). Post-anesthesia shivering can occur due to several factors, including exposure to cold environmental temperatures, ASA physical status, age, nutritional status and low body mass index, gender, and duration of surgery. Masitoh (2018) stated in his research that 9 people (22.5%) who underwent surgery < 60 minutes experienced shivering and as many as 12 people who underwent surgery > 60 minutes experienced shivering.

Latief et al (2010), said that the larger the needle size can cause the injected spinal drug to spread quickly and result in faster vasodilation of blood vessels. Meanwhile, nutritional status which influences the incidence of shivering in pregnant women can be measured using upper arm circumference (LILA). Pregnant women with LILA < 23.5cm are included in the Chronic Energy Deficiency (CED) category and are at risk for the pregnancy and risk for the baby (Kusparlina, 2016). However, the etiology of shivering in caesarean section patients with spinal anesthesia is still not well understood (Tilahun et al, 2020).





According to Morgan (2013), the mechanism of action of spinal anesthesia is: The spine consists of vertebral bones and fibrocartilaginous intervertebral disks. Consists of 7 cervical, 12 thoracic, and 5 lumbar vertebrae. The sacrum is a fusion of 5 sacral vertebrae, and there is a small rudimentary base of the coccygeal vertebra. The spine as a whole provides structural support for the body and protection for the spinal cord and nerves, and allows a degree of spatial mobility in several planes. The primary site of action of neuraxial blockade is the nerve root.

The spinal needle penetrates the skin, subcutaneously, penetrates the supraspinous ligament which stretches from the cervical vertebrae to the sacrum, the interspinous ligament which connects the two spinos, the ligamentum flavum (yellow elastic fibers), to the epidural space, dura mater, subarachnoid space. Local anesthetic is injected into the CSF (cerebro spinal fluid). Direct injection of local anesthetic into the CSF, provides a relatively small quantity and volume of local anesthetic to achieve high levels of sensory and motor blockade. Blockade of neural transmission in posterior nerve root fibers blocks somatic sensation, somatic blockade by inhibiting the transmission of pain impulses and eliminating skeletal muscle (skeletal) tone. Sensory blocks inhibit somatic or visceral pain stimuli while motor blocks cause muscle relaxation.

From several risks experienced due to hypothermia and shivering, it is necessary to carry out several interventions to reduce post-surgical shivering. Interventions that can be carried out can be pharmacological or non-pharmacological. Whatever method is used to reduce the rate of shivering, it must be done gradually and precisely, not quickly. The non-pharmacological methods include active internal or active external heating, as mentioned by Nur Akbar Fauzi (2014), some of which minimize heat loss during operation by sharing mechanical interventions such as:

- a) Increased environmental temperature (comfortable operating room temperature for patients ranges from 72°F or 22°C).
- b) Warm recovery room with room temperature of 75°F or 24°C.
- c) Use of low flow systems or closed systems in critical patients or high risk patients.
- d) Use of heat lamps or heating blankets or mattresses.





- e) Do a warm compress.
- f) Use of warmed crystalloid fluids (for intravenous fluid balance, for irrigation of surgical wounds, for cystoscopic procedures).
- g) Avoid pooling of blood or fluid on the operating table and warm recovery room.

2. Research Methods

Research design is a research design that is structured in such a way that it can guide researchers to obtain answers to research questions. In a broader sense, research design covers various things that researchers do, starting from problem identification, hypothesis formulation, hypothesis operationalization, data collection methods, to finally data analysis. In a narrow sense, research design refers to the type of research used to achieve research objectives. Therefore, research design is useful as a guide for achieving research objectives (Sastroasmoro et al, 2014).

This study used a descriptive study design, namely the aim was to determine the incidence of patient shifting in intra spinal anesthesia patients at Aliya Kendari Sj Hospital.

The subject approach model used is cross-sectional observation. According to Sastroasmoro et al (2014), cross sectional means that researchers make observations or measurements of variables at a certain time. The term one moment does not mean that all subjects were observed at exactly the same time, but that each subject was only observed once and measurements of subject variables were carried out at the time of that examination. Thus, in this study the researchers did not carry out follow-up on the measurements taken. This study uses primary data in the form of direct observations to determine the incidence of shivering in intra-spinal anesthesia patients.

3. Results and Discussion

1. Results

Table 1.
Multivariate Logistic Regression Analysis

No	Variable	β	Wald	Pvalue	OR	95%CI
1	Age	-3,458	4,987	0.026	0.031	0.002-0.655
2	Operating Room	2,354	5,309	0.021	10,525	1,421-77,950





	Temperature					
3	Body temperature	2,578	7,064	0.008	13,170	1,968-88,146
4	Constant	0.269	0.044	0.834	1,308	

Modeling of logistic regression using the *backward stepwise method* shows that the most dominant factor influencing the incidence of *shivering* in the Central Surgical Installation of Aliya Kendari Sj Hospital is body temperature with a significance value of 0.008 and an *odds ratio* of 13.1.

2. Discussion

Research by Millizia *et.al.* (2020) who concluded that there was a significant relationship between age and the incidence of *post anesthetic shivering* with a value of <0.05 (Millizia *et al.*, 2020).

The results of the study showed that there was a significant relationship between the length of surgery and the incidence of *shivering*. These results are in line with research by Mashitoh *et. al.* (2018) on 40 research respondents concluded that there was a significant relationship between the length of surgery and the incidence of *shivering* in post-spinal anesthesia patients (p 0.007).

Patients who stay in the operating room for too long at a low temperature will increase the risk of hypothermia which causes *shivering*.

The results of the study showed that there was a relationship between operating room temperature and the incidence of *shivering in caesarean section* patients. A low operating room temperature is absolutely necessary to suppress the growth of microorganisms in the operating room.

Long operations cause the patient's body to be exposed for too long to the temperature of the operating room which causes the patient's body temperature to decrease, this causes vasodilation due to the effects of anesthetic drugs which cause body heat to escape into the environment, besides that anesthetic drugs can also inhibit the body's mechanism for compensating for heat loss. This, coupled with the longer duration of surgery, will lengthen the time the body is exposed to cold temperatures.





Research by Hidayah et.al. (2021) provided an overview of the incidence of shivering that occurred in 26 respondents (37.7%) due to patients being exposed to operating room temperature for too long for a moderate duration of 34 respondents (49.3%) (Hidayah et al., 2021).

The results of the study showed that there was a significant relationship between upper arm circumference and the incidence of shivering. Upper arm circumference was chosen as the research variable to replace body weight or Body Mass Index because it is more objective in measuring the nutritional status of pregnant women.

Research by Andri et.al. (2017) revealed that the incidence of shivering was higher with a thin Body Mass Index compared to a non-thin BMI. The results of the analysis showed that there was a relationship between BMI and the incidence of shivering in patients undergoing spinal anesthesia. There were 40 respondents, most of whom had a thin BMI and most experienced shivering (Andri et al., 2017).

Research by Tifana et.al (2023) also showed the same results that there was a relationship between BMI and the incidence of shivering in post-operative patients with spinal anesthesia in 49 respondents studied in the PACU (Tifana et al., 2023).

The results of the study showed that there was a significant relationship between body temperature and the incidence of shivering. This is in line with research by Feng et.al. (2021) who concluded that patients with hypothermia have a 7.78 times greater risk of shivering than patients who have a normal body temperature with a significance value of 0.00 (Feng et al., 2021).

When the core temperature decreases by 0.5 °C or to the shivering threshold, peripheral thermosensors transmit thermal information through the lateral spinothalamic tract to the preoptic area of the anterior hypothalamus, which is the center of thermoregulation. Then the area between the anterior and posterior hypothalamus, where the shivering efferent pathway begins, sends reaction information to the reticular formation in the pons, leading to uncontrollable and repetitive skeletal muscles.





4. Conclusion

This study concluded that the most dominant factor influencing the incidence of shivering is body temperature with a significance value in logistic regression analysis of 0.008 with an odds ratio of 13.1. The use of drugs in this study was not controlled, in future research future researchers will examine further the use of drugs in patients or other surgical procedures.

5. Compliance with ethical standards

Acknowledgments

The researcher would like to thank the Director of the Hospital and his staff, especially the patient and the patient's family, as well as all parties who have helped carry out this research and hope that this research can be useful for the community and health workers, especially in providing health services to the community.

Disclosure of conflict of interest

This research collaboration is a positive thing for all researchers so that conflicts, problems and others are absolutely no problem for all writers.

Statement of informed consent

Every action we take as authors is a mutual agreement or consent.

References

- Abate, SM, Chekole, YA, Minaye, SY, & Basu, B. (2020). Global prevalence and reasons for case cancellation on the intended day of surgery: A systematic review and meta-analysis. *International Journal of Surgery Open*, 26, 55–63.
- Amurwani, FS, & Rofi'i, M. (2018). Factors Causing Postponement of Elective Surgery at Home Government Hospital in Semarang. *Journal of Medical Surgical Nursing*, 1(1), 17.
- Basuki, Kustiadi. 2019. "Review of Literature Related to the Concept of Anesthesia." ISSN 2502-3632. ISSN 2356-0304 (Paper) *International & National Online Journal* Vol. 7 No.1, January – June 2019 University 17 August 1945 Jakarta: 6–33.
- Desta, M., Manaye, A., Tefera, A., Worku, A., Wale, A., Mebrat, A., & Gobena, N. (2018). Incidence and causes of cancellations of elective surgery on the intended day of surgery at a tertiary academic medical referral.
- Dahlan, M Sofiyudin, 2008. Steps to making a research proposal in the field of medicine and health. Jakarta.





- Feng, G., Wang, Y., Feng, J., Luo, X., Li, C., & Yao, S. (2021). The relationship between core temperature and perioperative shivering during cesarean section under intrathecal anesthesia with bupivacaine and ropivacaine: a randomized controlled study. *Journal of Anesthesia*, 35 (6), 889–895. <https://doi.org/10.1007/s00540-021-02995-9>
- Hidayah, ES, Khalidi, MR, & Nugroho, H. (2021). Post Shivering Incident Comparison Operation with General Anesthesia and Spinal Anesthesia at Abdul Wahab Sjahranie Hospital, Samarinda. *Journal of Science And Health*, 3 (4), 525–530.
- Ebirim LN, Buowari DY, Ezike HA 2012. Causes Of Cancellation Of Elective Surgical Operations At A University Teaching Hospital. *Journal of Medicine and Medical Sciences* Vol. 3(5) pp. 297-301, May 2012.
- Elrahman, A., Hamza, AA, El-Haj, M. 2014. Cancellation of Elective General Surgical Operations on the Day of Intended Surgery. *Global Journal of Human-Social Science: I Surgeries and Cardiovascular Systems*. Volume 14 Issue 3 Version 1.0 Year 2014.
- Fitnaningsih Endang Cahyawati, Fathiyatur Rohmah, Agus Gunadi, Suci Aprilia. 2019. "The Effect of Warm Intravenous Fluids on the Degree of Shivering in Post Sectio Caesarea Patients at PKU Muhammadiyah Gamping Hospital." *Journal of Midwifery* 8(2): 86.
- Fitri, AN 2014. Analysis of Waiting Time for Elective Surgery for Inpatients in Installations Central Surgery at Dharmais Cancer Hospital in 2014.
- Gajida, AU, Takai, IU, Nuhu, YN 2016. Cancellations Of Elective Surgical Procedures Performed At A Teaching Hospital In North-West Nigeria. Original Article. *Journal of Medicine in the Tropics* (2016).
- Herkutanto. 2007. *Medicolegal Aspects*
- Goodman, T., & Spry, C. (2017). *Essentials of Perioperative Nursing*. Jones & Bartlett Learning.
- Kaddoum, R., Fadlallah, R., Hitti, E., EL-Jardali, F., & el Eid, G. (2016). Causes of cancellations on the day of surgery at a Tertiary Teaching Hospital. *BMC Health Services Research*, 16 (1), 259.
- Hospital Accreditation Commission. (2022). *KARS Accreditation Survey Instrument According to Standards Hospital Accreditation of the Ministry of Health of the Republic of Indonesia* (Sutoto, Ed.). Hospital Accreditation Commission.
- Kristen, Y., Sutriningsih, A., & Ardhiyani, VM (2015). Waiting Time Relationship With Priority 3 Patient Satisfaction at the Emergency Room at Waluya Sawahan Hospital, Malang. *CARE Journal*, 3 (1), 33–38.
- Luo, L., Zhang, F., Yao, Y., Gong, R., Fu, M., & Xiao, J. (2020). Machine learning for identification of surgeries with high risks of cancellation. *Health Informatics Journal*, 26 (1), 141–155.





- Mashitoh, Dewi, Ni Ketut Mendri, and Abdul Majid. 2018. "Length of Operation and Events Shivering in Post-Spinal Anesthesia Patients." *Journal of Applied Nursing (Jurnal of Applied Nursing)* 4(1): 14. Mulyandari, Ristanti. 2020. "Relationship between the duration of abdominal surgery and the incidence of shivering after general anesthesia at IBS, Wates Kulonprogo Regional Hospital." : 8–24.
- Mashitoh, D., Mendri, N.K., & Majid, A. (2018). Length of Operation and Shivering Events In Post-Spinal Anesthesia Patients. *Journal of Applied Nursing*, 4 (1), 14.
- Millizia, A., Fitriany, J., & Siregar, DA (2020). Factors Related to Post Anesthetic Shivering in Spinal Anesthesia Patients at the PPK BLUD Central Surgical Installation at Cut Meutia Hospital, North Aceh, *Lentera: Scientific Journal of Science, Technology, Economics, Social and Culture* , 4 (4), 40–46.
- Rosdiana, R., Djunaedi, D., & Aditia, D. (2023). Parents' Knowledge of Elementary School Children Regarding Persistent Health Cases. Barongko: *Journal of Health Sciences*, 1(3), 122–128. <https://doi.org/10.59585/bajik.v1i3.109>
- Resti Wijayanti, FE, HB, E., Ratu, M., Arfah, A., Hartati, A., & Werdyaningsih, E. (2022). Factor Analysis of the Implementation of Nursing Care Standards in Community Health Center Inpatient Rooms. Barongko: *Journal of Health Sciences*, 1(1), 47–49. <https://doi.org/10.59585/bajik.v1i1.39>
- Sugiyono. (2019). *Quantitative, Qualitative, and R&D Research Methods*. Alfabeta.
- Stuart, GW and Sundeen, SJ, *Principles and practice of psychiatric nursing* (5th ed) St Louis: Mosby Year Book, 1995.
- Stuart, GW and Laraia, MT, *Principles and practice of psychiatric nursing* (6th ed) St Louis: Mosby Year Book, 1998.
- Srianin gsih, S., Wijaya, A., Pannyiwi, R., Anto, S., Muhajrin, M., & Rauf, NI (2022). Family Nursing Care with Environmental Health Problems. Barongko: *Journal of Health Sciences*, 1(1), 53 –56. <https://doi.org/10.59585/bajik.v1i1.41>
- Susiandari, A. (2024). Tool Use Contraception Implants on Knowledge of Couples of Childbearing Age in the Mamuju Community Health Center Work Area. *JIMAD: Multidisciplinary Scientific Journal*, 1(2), 125–131. <https://doi.org/10.59585/jimad.v1i2.292>
- Susanti, R., Imran, A., Briliannita, A., Akbar, A., Yermi, Y., B, M., Pannyiwi, R., & Rasyid, D. (2023). Counseling on clean and healthy living behavior in Minasatene District, Pangkajene Islands Regency. *Social Friends: Journal of Community Service*, 1(3), 92–98. <https://doi.org/10.59585/sosisabdimas.v1i3.70>
- Townsend, MC, *Nursing diagnoses in psychiatric nursing: guidelines for making nursing plans*, EGC, Jakarta, 1998.
- Toalu, A., Alwy, SNA, Baharuddin, B., & Nurhartati, A. (2023). Analysis of the Quality of Refillable Drinking Water Depots in the Tamalanrea Community Health Center Area.





Publish: Association of Indonesian Teachers and Lecturers
International Journal of Health Sciences (IJHS)

Journal Homepage: <https://jurnal.agdosi.com/index.php/IJHS/index>

Volume 2 | Number 2 | June 2024 |



JIMAD: Multidisciplinary Scientific Journal, 1(1), 30–37.
<https://doi.org/10.59585/jimad.v1i1.154>

Wulandari, S., Jamila, S., Rabiah, R., Mardini, RS, Magelo, WG, & Pratiwi, A. (2023). Educational Outreach on the Dangers of Smoking at SMP Negeri 11 Sigi. *Social Friends: Journal of Community Service*, 1(4), 152–159.
<https://doi.org/10.59585/sosisabdimas.v1i4.127>

Book Source:

Ali Imran; Dr. A. Nursinah; Verawati; Rusnita Textbook of HEALTH COMMUNICATION (Key to Success in Hospital Administration). ISBN: 978-623-10-0088-0.
<https://agdosi.com/2024/04/04/buku-ajar-komunikasi-kesehatan-kunci-sukses-administrasi-rumah-sakit/>

Donny Aditia; Fransina Tubalawony; Son; Mochamad Robby Fajar Cahya; Nur Febrianti; Risca Hamdanesti; Goddess Kokmesa; Israeli ; Kurniati Nawangwulan; Yusnita Yusufik. *Wound Care And Treatment For Health*. No. ISBN: 978-623-09-8231-6.
<https://agdosi.com/2024/01/10/wound-care-and-treatment-for-health/>

M. Khalid Fredy Saputra; Lili Amaliah; Mohammad Sadli; Eko Prastyo; Dr. Abd. Rozak; Dr. Muh. Risal Tawil; Devin Mahendika; Wita Oileri Tikirik; Asbath Said; Ria Wahyuni. *HEALTH PROMOTION: Improving The Community's Healthy Quality Of Life*. No. ISBN: 978-623-09-8361-0.

Tri Ayu; Devin Mahendika; Nurul Aini Suria Saputri; Dr. M. Risal Tawil; Suratno Kaluku; Cut Mutia Tatisina; Egy Sunanda Putra; Lili Amaliah; Dr. Dwi Moerjoedianto; Dr. Djusmadi Rasyid; Lina Yunita. *Sociocultural Dynamics Of Health*. No. ISBN: 978-623-09-8156-2. <https://agdosi.com/2024/01/30/sociocultural-dynamics-of-health/>

