



The Overview of Shivering and Blood Pressure Occurance Before and After Liquid Co-Loading on Sectio Caesarea Patients

journal home page: www.javanursingjournal.org/index

Anisa Fatmawati¹, Septian Mixrova Sebayang¹, Noor Yunida Triana², Made Suandika¹

¹Anesthesiology Nursing Study Program Applied Undergraduate Program Faculty of Health Harapan Bangsa University

²Undergraduate Nursing Study Program, Faculty of Health, Harapan Bangsa University



CROSS-SECTIONAL DESIGN

ARTICLE HISTORY

Received: August 27, 2023
Revised: September 22, 2023
Accepted: Oktober 10, 2023

DOI: 10.61716/jnj.v1i2.20

*Corresponding author:

Anisa Fatmawati
Anesthesiology Nursing Study Program
Sarjana Applied Program, Faculty of
Health, Harapan Bangsa University,
Indonesia Jl. Raden Patah No.100,
Ledug, Kembaran, Purwokerto,
Banyumas, Central Java Indonesia.
Email: anisafatmawaati@gmail.com



Keywords: Sectio caesarea, shivering, hypotention

Introduction:

Sectio caesarea is a surgical incision of the abdominal wall and uterus to remove the fetus, placenta, and amniotic fluid (1). Obstetric Anesthesia Guidelines recommend spinal or epidural anesthesia techniques as the first anesthetic choice in cesarean delivery, but spinal anesthesia is more commonly used (2). Spinal anesthesia is the entry of local anesthetic drugs into the lumbar subarachnoid, causing loss of sensory activity and motor block (3).

Abstract

Background: The incidence of shivering and hypotension in cesarean delivery is frequent. The incidence of shivering due to spinal anesthesia is reported to reach 50-65%. Hypotension after spinal anesthesia in a cesarean section can occur in up to 80%. Fluid loading is done to reduce shivering and overcome hypotension in mothers who have a cesarean delivery. **Purpose:** The study was to determine the description of the incidence of shivering and blood pressure before and after fluid coloadng in section cesarean patients at RSI Banjarnegara. **Method:** The design of this study was descriptive with a cross-sectional approach. The study was conducted in June 2023. The sample of this study was 44 respondents with purposive sampling techniques. **Results:** The results showed that the incidence of shivering was experienced by many respondents after being given coloadng, which was 37 respondents (84.1%), compared to before coloadng, there were only 5 respondents (11.4%). While in blood pressure, before coloadng, the majority experienced hypotension events as many as 37 respondents (84.1%), and after coloadng, most of the blood pressure became normal as many as 41 respondents (93.2%). **Conclusions:** It can be concluded that fluid coloadng is less effective for shivering treatment, but fluid coloadng is effective in maintaining blood pressure in mothers undergoing section caesarea after spinal anesthesia.

Hypotension is one of the most common side effects of spinal anesthesia due to sympathetic blockade in the subarachnoid space. Hypotension after spinal anesthesia in sectio caesarea can occur up to 80% in mothers without prophylaxis (4). Prolonged hypotension can result in the risk of cardiovascular complications such as ischemia and heart failure. Due to hypotension, blood flow to the base of the uterine blood vessels decreases, causing hypoxia, and decreased Apgar (5).

Shivering is also common in caesarean delivery. The incidence of shivering due to spinal anesthesia is reported to reach 50-65% due to vasodilation caused by spinal anesthesia which facilitates rapid heat loss and causes redistribution of body heat from the core to peripheral tissues, resulting in shivering (6). The procedure for managing the incidence of shivering and hypotension due to spinal anesthesia can be overcome by coloadng infusion fluids either crystalloid or colloid. Stated that fluid coloadng can be done to reduce the shivering scale (7)(8). Meanwhile, has proven that fluid coloadng is very effective for overcoming hypotension due to the mechanism of spinal anesthesia (9)(10).

Given the high frequency of shivering and hypotension complications in spinal anesthesia techniques, especially in sectio caesarean delivery and no research has been found related to coloadng as a treatment for shivering and hypotension at once, it makes researchers interested in conducting research on "Overview of Shivering and Blood Pressure Events Before and After Liquid Coloadng in Sectio Caesarea Patients". The purpose of this study was to determine the incidence of shivering and blood pressure before and after fluid coloadng in sectio caesarea patients.

Method:

Located at This research has been conducted at the Central Surgical Installation of the Islamic Hospital Banjarnegara on June 15 - June 28, 2023. Methods The research method used was descriptive method with a cross sectional approach. The population in this study were all sectio caesarea patients with spinal anesthesia at the Islamic Hospital. Banjarnegara. The sample in this study were 44 respondents with sampling technique using purposive sampling. Data collection was taken from observation sheets which were then processed using

SPSS and analyzed using univariate analysis. using univariate analysis

Result

Table 1. Frequency Distribution of Respondents by Age and Occupation

Respondent Characteristics	Frequency (f)	Percentage (%)
Age		
17-25 Years	15	34.1
26-35 Years	25	56.8
36-45 Years	4	9.1
Occupation		
Employed	21	47.7
Not Working	23	52.3

The results of the study in table 1 show that of the 44 respondents, the highest age of respondents who underwent sectio caesarea was found to be in the age range of 26-35 years as many as 25 respondents (56.8%), and most respondents did not work, namely 23 respondents (52.3%).

Table 2. Frequency Distribution of Fluid Administration and Total Coloadng in Sectio Caesarea Patients

Fluid Administration	Frequency (f)	Percentage (%)
Types of Liquids		
Colloids	30	68.2
Crystalloids and colloids	14	31.8
Coloadng		
500 cc	31	70.5
>500 cc	13	29.5

Table 2 shows that most resuscitators used colloidal fluid types, 30 respondents (68.2%) and the most coloadng was 500 cc in 31 respondents (70.5%).

Table 3. Frequency Distribution of Shivering Before and After Coloadng

Shivering	Frequency (f)	Percentage (%)
Shivering Before Coloadng		
Yes	5	11.4
No	39	88.6

Shivering After Coloding		
Yes	37	84.1
No	7	15.9

Table 3 shows that of the 44 respondents before coloding, most respondents did not experience shivering, namely 39 respondents (88.6%). While after coloding as many as 37 respondents (84.1%) experienced shivering.

Table 4. Frequency Distribution of Blood Pressure Before and After Fluid Coloding in Sectio Caesarea Patients

Blood Pressure	Frequency (f)	Percentage (%)
Blood Pressure Before Coloding		
Hypotension	37	84.1
Normal	7	15.9
Blood Pressure After Coloding		
Hypotension	3	6.8
Normal	41	93.2

Table 4 shows that blood pressure before coloding in 44 respondents was mostly hypotensive as many as 37 respondents (84.1%). While blood pressure after coloding is mostly normal, namely 41 respondents (93.2%).

Discussion

An Overview of Shivering and Blood Pressure Occurance Before and After Liquid Co-Loading on Sectio Caesarea Patients

1. General Characteristics of Respondents by Age and Occupation

Based on the results of age, it was found that the most common age for sectio caesarea was between 26 years and 35 years. According to the researcher's assumption, this could be due to the mothers who came to give birth mostly aged 26-35 years. The pregnancy complications that are indications for cesarean section according to are premature rupture of

membranes, severe preeclampsia, placenta previa, fetal abnormality, oligohydramnios and fetal distress (11).

This study is in line with research conducted of 96 patients who underwent cesarean section, patients with an age range of 26 to 30 years were the most patients who underwent cesarean section surgery (54.2%) (12). Research in Pakistan also states that delivery by cesarean section occurs mostly in the age range of 26 to 35 years (13).

The optimal reproductive age for mothers is 20-35 years because at that age the reproductive organs are mature and the uterus is ready to accept pregnancy. From a biological point of view, this age is the right time to get pregnant because the fertility rate is very high and the eggs produced are very abundant. The risk of having a birth defect is less because the quality of eggs produced at this age is generally still very good (14).

According to the age of the mother also determines the maternal age and is closely related to the conditions of pregnancy, childbirth, and the baby. Mothers who are under 20 years old or over 35 years old are very at risk of undergoing sectio caesarea. The incidence of sectio caesarea at the age of <20 years is related to the level of maturity of the reproductive organs including the pelvis. Where the condition of the pelvis is more prone to narrowness due to imperfect pelvic growth is an indication for cesarean section. Whereas mothers with age >35 years are more prone to labor complications such as preeclampsia and hypertension so that the risk for delivery by cesarean section is also high.

Another respondent characteristic is employment. Work is something that is done to support family life. Work can

describe the activities and economic welfare obtained (15). Based on the results of the study obtained, the majority of mothers who performed caesarean delivery were mothers who did not work. This is in line with the research of that the majority of mothers who underwent sectio caesarea were mothers who did not work (housewives) as many as 54 respondents (57.45%) (16). Then in the research of that the majority of respondents did not work or as housewives as many as 68 respondents (71.5%) of 95 respondents (17). Followed by research the majority of mothers who gave birth to sectio caesarea based on work were not working as many as 100 respondents (64.5%) of 155 respondents (18).

In contrast to the research of which states that the majority of respondents who work as private employees are 1.36 times more likely to perform cesarean delivery than respondents who do not work (19). Working and non-working mothers have differences in the lack of information or knowledge related to cesarean delivery (20). Working mothers have a better level of knowledge than non-working mothers, because working mothers will have more opportunities to interact with other people, so they have more opportunities to get information about their health conditions, one example is information on early detection of risk factors during pregnancy (11).

This is not an indication of the relationship between work and sectio caesarea or that there is no relationship between sectio caesarea and work, but only shows the number of visits by mothers who experienced labor with sectio caesarea, the majority of whom were not working. Sectio Caesarea (SC) is a type of delivery where the mother can determine the date and time of delivery. By having a cesarean section

delivery, working mothers can more easily arrange a birth schedule that can be adjusted to work. Overview of anesthesiologist occupational stress based on age

This study shows that most anesthesiologists in hospitals in Banyumas Regency are in the age range of 36-45 years (Late Adulthood) as many as 21 respondents (53.8%) with a percentage of mild stress 9 respondents (28.2%) and moderate stress 1 respondent (2.6%) higher than other age ranges. This research is not in line which states that 20-40 years old experience higher stress than 41-65 years old. Job stress is experienced more by people under the age of 40 than people over the age of 40. However, people over the age of 40 can also experience work stress problems due to their poor physical condition.

Older people who do not experience severe stress because they can still control the workload even though they are not in the best physical condition, so they only experience mild stress. It is difficult to look at the age factor specifically because there are several other factors within individual characteristics that can influence the relationship between job stress and age. With increasing age, individuals will have better knowledge than before and have a greater sense of responsibility, which will cover their limitations in adapting.

Anesthesiologists with young age experience stress due to their lack of experience and for anesthesiologists with old age experience stress due to physical conditions that are not optimal. In the study of anesthesiologists in the Banyumas Regency area, the majority of stress was found in the age range of 36-45 years (Late Adulthood), because the majority of anesthesiologists in the Banyumas Regency area were in the

age range of 36-45 years (Late Adulthood).

In this study, the majority of sectio caesarean deliveries were performed by non-working mothers. According to the researcher's assumption, this is related to the longer recovery time of cesarean section than vaginal delivery. Whereas working mothers usually have a short time off. According to wound healing after cesarean section surgery is approximately 1 week, but for 4-6 weeks the mother should not do strenuous activities or lift heavy objects and pain will be felt for up to 6 months with mild intensity caused by thread knots in the fascia (muscle sheath). This can be taken into consideration by working mothers to have a cesarean delivery (24).

2. Liquid Type

Based on the results of the fluid type study, it was found that the type of fluid used more often was colloidal fluid. This is because colloidal fluids are preferred as fluid resuscitation after spinal anesthesia because they are considered capable of providing better recovery results and patient comfort compared to crystalloid administration. The fluid combination in this study continued to use colloidal fluid as the initial resuscitation fluid given in larger amounts (500cc) and continued with the use of crystalloid fluid (250 cc).

This is in line with the opinion of that colloidal fluids are more effective than crystalloids in sectio caesarea patients (10). A systematic review also concluded that colloidal fluids were significantly more effective than crystalloid fluids in reducing the risk of hypotension in sectio caesarea using spinal anesthesia (25). Colloidal fluid has the ability to increase osmotic pressure in blood vessels, so it can help increase plasma volume and maintain blood pressure.

Research conducted states that the combination of 500 cc colloidal fluid and 500 cc crystalloid is more effective in maintaining Mean Arterial Pressure (MAP) compared to 1000 cc crystalloid fluid administration with an average value of 80,17. In addition, research also stated that the combination group was more effective in preventing hypotension because the amount of fluid given was greater 1000 ml (750 ml crystalloid and 250 ml colloid) compared to 500 ml colloid in other groups (26). From these two studies, the amount of crystalloid fluid given is quite a lot. The administration of crystalloids in large quantities must still be considered, because if given in excess it can result in severe edema (3).

Intravenous fluid administration can also be used to prevent hypothermia and reduce shivering after spinal anesthesia. Using nonpharmacological methods such as the administration of fluid therapy can reduce the need for the use of drugs and as a result can reduce the occurrence of complications (27).

In a study, it was stated that the administration of fluid therapy to reduce shivering can be done without having to be warmed first (28). To achieve maximum effectiveness, fluids must be given quickly to reduce vasodilation resulting from spinal anesthesia. This rapid administration of fluids will result in peripheral vasoconstriction. It is this peripheral vasoconstriction that maintains the core to peripheral temperature gradient.

According to the researchers' assumptions, both the use of colloidal and crystalloid fluids are effective in maintaining blood pressure in patients. Of course, the choice of fluid type for patient treatment must be based on the patient's condition and needs. Explains that crystalloid fluids can be used to treat hypotension because they have

low oncotic pressure so that they can be quickly distributed throughout the extracellular (9). However, colloidal fluids are generally the first choice because they have been shown to increase osmotic pressure and improve plasma volume. Therefore colloidal fluids are often used as initial fluid resuscitation.

The choice of fluid type to reduce the incidence of shivering has so far not been specifically explained in previous studies. According to the researcher's assumption, both types of fluids can be used in the management of shivering, but it seems that colloidal fluids are more recommended because they can stay longer in the intravascular space than crystalloid fluids.

In terms of coloadng, it was found that most respondents used coloadng of 500 cc. The coloadng of 500 cc or more is adjusted based on the needs of each patient and related medical conditions. Coloadng more than 500 cc is given if the respondent's problem has not been resolved after coloadng 500 cc.

This is in line with the research of (3) who used preload liquid with an amount of 500 - 1000 ml. Also stated that normally coloadng is given in the amount of 10-15 ml / kg with significant time in the first 15 minutes after spinal anesthesia. In this study, the amount of coloadng used was 500 cc and 750 cc (29).

Coloadng will affect the volume of extracellular fluid which also plays a role in blood pressure regulation. Coloadng will affect extracellular fluid volume, but the body will provide compensatory measures to adjust blood pressure with baroreceptor mechanisms by changing cardiac output and total peripheral resistance through autonomic nervous system effects on the heart and blood vessels, as well as by moving fluid into the interstitium

compartment or vice versa into the blood. This fluid transfer occurs immediately and automatically due to changes in the balance of hydrostatic and osmotic forces acting on the capillary wall (30).

Research by (7) and (8) also stated that coloadng also plays a role in reducing the scale of shivering, but not significantly. The main factor causing shivering is hypothermia. Perioperative hypothermia during caesarean delivery is caused by redistribution of intravascular volume from the core to the peripheral compartment resulting in vasodilation, which causes the body to lose heat by radiation (8). Intravenous fluid administration by coloadng can trigger peripheral vasoconstriction. The resulting peripheral vasoconstriction is likely to contribute to a decrease in the thermal distribution volume, leading to heat gain. This heat content is then distributed throughout the body resulting in changes in core temperature (28).

3. Overview of Shivering Events Before and After Fluid Coloadng in Sectio Caesarea Patients

Based on the results of the shivering study, the incidence of shivering after coloadng, most respondents actually experienced shivering. The data shows that there was a large increase in the number of respondents who experienced shivering. This change may indicate the effectiveness of the intervention or there are other things that affect the level of shivering in respondents.

This is in line with research conducted (31) found that respondents who experienced shivering were 44 people (55.0%) and respondents who did not experience shivering were 36 people (45.0%). Shivering occurs due to side effects of spinal anesthesia. In

addition, there are other factors that cause shivering, such as age, body weight, amount of bleeding, room temperature, length of surgery, and block height (32).

Shivering is caused by the mechanism of spinal anesthesia due to vasodilation, which causes rapid heat loss and causes redistribution of body temperature from the core to peripheral tissues, resulting in hypothermia and shivering (6).

According to the researcher's assumption, coloadng is less effective in treating shivering. This is in accordance with the research of (8) and (7) which stated that coloadng can be done to reduce shivering, but cannot significantly reduce the scale of shivering. Coloadng causes a drastic decrease in body temperature (impaired thermoregulation) which results in a spike in the transfer of potassium ions to the extracellular, thus triggering shivering. In addition, there are other factors that may affect the incidence of shivering such as room temperature. According to the theory of (33) operating rooms with temperatures less than 20°C can cause a decrease in body temperature. Meanwhile, the operating room temperature used during the study was 16°C-17°C to help reduce the impact of infection.

4. Overview of Blood Pressure Before and After Fluid Coading in Sectio Caesarea Patients

Based on the results of blood pressure research, blood pressure after coloadng has increased. This change showed a significant increase in the number of respondents who had normal blood pressure and a significant decrease in the number of respondents with hypotension.

This is in line with (34) research which states that there are changes in blood pressure before and after fluid

coloadng in spinal anesthesia patients, where blood pressure after coloadng of both crystalloid and colloidal fluids decreases after 5 minutes and increases again after 10-15 minutes. In the research of (3) also stated that there was a significant difference between the average systolic and diastolic blood pressure between patients who were hydrated with RL fluid preload and without RL fluid preload. Followed by research of (35) which states that giving fluid preload is proven to prevent hypotension after spinal anesthesia, where as many as 82% of patients who before spinal anesthesia were given fluid preload with an amount of 1000 ml did not experience hypotension and the remaining 18% experienced hypotension.

The decrease in blood pressure in sectio caesarea delivery occurs due to the side effects of spinal anesthesia which causes vasodilation and consequently hypotension (36). Hypotension before coloadng can occur due to several factors, including significant fluid loss, lack of blood volume, or reaction to previous drugs or anesthesia (4). Hypotensive events if not treated properly can result in a decrease in cerebral perfusion, triggering vomiting (37). In addition, prolonged hypotension can result in tissue and organ hypoxia, if this situation continues, it will result in a state of shock until death (30).

According to the researcher's assumption, the provision of fluid therapy both preloading and coloadng is very important in spinal anesthesia patients to maintain blood pressure stability during surgery. Coloadng has a significant effect in overcoming hypotension after spinal anesthesia. This action can optimize blood pressure, so as to minimize the risk of complications during surgery.

Conclusion

Coloading is less effective in treating shivering. Coloading causes a drastic decrease in body temperature (impaired thermoregulation) which results in a spike in the transfer of potassium ions to the extracellular, thus triggering shivering. However, coloadng fluid therapy is very important in spinal anesthesia patients to maintain blood pressure stability during surgery. Coloading has a significant effect in overcoming hypotension after spinal anesthesia. This action can optimize blood pressure, thus minimizing the risk of complications during surgery.

References

1. Sanjaya D A, Luh N, Inca P, Agustini B, Agus IG, Putra S, et al. Procedure for Using Crystalloid and Colloid Fluids in Blood Pressure in Sectio Caesaria Patients Using Spinal Anesthesia Technique. *Jurnal Kesehatan Primer*. 2018;3(2):87–93.
2. Tanambel, P., Kumaat, L., & Lalenoh, D. (2017). Profil Penurunan Tekanan Darah (hipotensi) pada Pasien Sectio Caesarea yang Diberikan Anestesi Spinal dengan Menggunakan Bupivakain. *E-CliniC*, 5(1), 1–6. <https://doi.org/10.35790/ecl.5.1.2017.15813>.
3. Asra, & Nurhayati. (2022). Perbedaan Tekanan Dasar Hidrasi Preload dan Tanpa Preload Cairan Ringer Laktat Pasien Pasca Anestesi Spinal. 2(2), 116–128.
4. Rijs, K., Mercier, F. J., Lucas, D. N., Rossaint, R., Klimek, M., & Heesen, M. (2020). Fluid loading therapy to prevent spinal hypotension in women undergoing elective caesarean section: Network meta-analysis, trial sequential analysis and meta-regression. *European Journal of Anaesthesiology*, 37(12), 1126–1142. <https://doi.org/10.1097/EJA.0000000000001371>.
5. Khosravi, F., Alishahi, M., Khanchemehr, Y., & Jarineshin, H. (2019). A Comparison Between the Effects of Preloading with Ringer's Solution and Voluven on Hemodynamic Changes in Patients Undergoing Elective Cesarean Section Under Spinal Anesthesia. *Medical Archives (Sarajevo, Bosnia and Herzegovina)*, 73(1), 44–48. <https://doi.org/10.5455/medarh.2019.73.44-48>.
6. Amsalu, H., Zemedkun, A., Regasa, T., & Adamu, Y. (2022). Evidence-Based Guideline on Prevention and Management of Shivering After Spinal Anesthesia in Resource-Limited Settings: Review Article. *International Journal of General Medicine*, 15(September), 6985–6998. <https://doi.org/10.2147/IJGM.S370439>.
7. Jun, J. H., Chung, M. H., Jun, I. J., Kim, Y., Kim, H., Kim, J. H., Choi, Y. R., & Choi, E. M. (2019). Efficacy of forced-air warming and warmed intravenous fluid for prevention of hypothermia and shivering during caesarean delivery under spinal anaesthesia: A randomised controlled trial. *European Journal of Anaesthesiology*, 36(6), 442–448. <https://doi.org/10.1097/EJA.0000000000000990>.
8. Cobb, B., Cho, Y., Hilton, G., Ting, V., & Carvalho, B. (2016). Active Warming Utilizing Combined IV Fluid and Forced-Air Warming Decreases Hypothermia and Improves Maternal Comfort during Cesarean Delivery: A Randomized

- Control Trial. *Anesthesia and Analgesia*, 122(5), 1490–1497. <https://doi.org/10.1213/ANE.0000000000001181>
9. Yadav, S., & Verma, R. (2019). Efficacy Of Cristalloids and Colloids AS Preloading Fluid To Prevent Hypotension In Spinal Anesthesia In Ellective C- Section. *International Journal Of Medical and Biomedical Studies*, 3(6), 145– 147.
 10. Gustomi, M. P., & Qomariyah. (2018). Efektifitas pemberian cairan kristaloid dan koloid pada pasien SC (sectio caesarea) dengan regional anestesi terhadap mean arterial pressure. *Journal of Ners Community*, 9(1), 106–118.
 11. Zulfah, S. A. (2020). Gambaran Karakteristik Ibu Bersalin Sectio Caesarea Berdasarkan Literatur Review. *Literatur Review*.
 12. Saputri, D. E., Josephine, C. V., Oktavia, E., & Sumbayak, E. M. (2019). Gambaran Tingkat Pengetahuan Mengenai Anestesi Spinal Operasi Sectio Caesaria pada Ibu Hamil di Klinik Ibu dan Anak. 102–108.
 13. Imani, R. I. (2020). Gambaran Kecemasan Pasien Preoperatif Sectio Caesarea dengan anestesi spinal di RSIA Siti Hawa Padang. *Jurnal Ilmu Kesehatan Indonesia*, 1(2), 111–116. <https://doi.org/10.25077/jikesi.v1i2.33>.
 14. Hijriani, Rahim, I., Hengky, J., & Kumaladewi. (2020). Karakteristik Ibu Bersalin Dengan Sectio Caesarea Di Rumah Sakit Umum Daerah Andi Makkasau Parepare. *Jurnal Ilmiah Manusia Dan Kesehatan*, 3(2), 257–264. <https://doi.org/10.31850/makes.v3i2.302>.
 15. Rezeki, S., & Sari, M. (2018). Karakteristik Ibu Bersalin Dengan Indikasi Sectio Caesarea Di Rumah Sakit Martha Friska Pulo Brayan Pada Tahun 2018. *Wahana Inovasi*, 7(1), 131–136. <http://penelitian.uisu.ac.id/wp-content/uploads/2018/10/17.-Sri-Rejeki-dan-Maya-sari.pdf>
 16. Daniyati, A., & Mawaddah, S. (2021). Faktor-faktor Penyebab Terjadinya Persalinan Dengan Tindakan Sectio Caesarea di Ruang Bersalin Rumah Sakit Tingkat IV Wira Bhakti Mataram. *Jurnal Ilmu Kesehatan Dan Farmasi*, 9(2), 14–18. <https://doi.org/10.51673/jikf.v9i2.872>.
 17. Susanto, Y. P. P., Wahdaniah, N., & Juniarti. (2019). Faktor-Faktor Yang Berhubungan Dengan Persalinan Sectio Caesaria. *Jurnal Kesehatan Delima Pelamonia*, 3(1), 1–9. <file:///C:/Users/yohanna aritonang/Documents/NIDA/KTI/119-Article Text-407-1-10-20200117.pdf>.
 18. Mulyaningsih, W. O. S., Mutmainna, A., & Kasim, J. (2021). Faktor Determinan Indikasi Sectio Caesarea. *Jurnal Ilmiah Mahasiswa & Penelitian Keperawatan*, 1(3), 400–407.
 19. Sihombing, N., Saptarini, I., Sisca Kumala Putri, D., Penelitian dan Pengembangan Upaya Kesehatan Masyarakat, P., & Litbang Kesehatan, B. (2017). Determinan Persalinan Sectio Caesarea Di Indonesia (Analisis Lanjut Data Riskesdas 2013). *Jurnal Kesehatan Reproduksi*, 8(1), 63–75. <https://doi.org/10.22435/kespro.v8i1.6641.63-75>.
 20. Amir, F., & Yulianti, S. (2020). Hubungan Paritas dan Usia Terhadap Persalinan Sectio Ccaesarea di RSUD Bahagia Makassar Tahun 2020. *Jurnal Kesehatan*

- Delima Pelamonia*, 4(2), 75–84. <https://doi.org/10.37337/jkdp.v4i2.179>.
24. Damayanti, I. P. (2014). Faktor-faktor yang Berhubungan dengan Penyembuhan Luka Post Sectio Caesarea di RSUD Arifin Achmad Provinsi Riau Tahun 2013. *Jurnal Kesehatan Komunitas*, 2(5), 207–210. <https://doi.org/10.25311/keskom.vol2.iss5.75>
 25. Melchor, R., ESpinoza, Martinez, H., Casans, F., Navarro, P., Abad, G., & Velcino, C. (2015). Colloids versus crystalloids in the prevention of hypotension induced by spinal anesthesia in elective cesarean section. A systematic review and meta-analysis. *Italian Society Of Anesthesiology, Analgesia, Rersucitation and Intensive Care*, 81(9), 1019–1030.
 26. Idehen, H. O., Amadasun, F. E., & Ekwere, I. T. (2022). Comparison of intravenous colloid and colloid-crystalloid combination in hypotension prophylaxis during spinal anesthesia for cesarean section. *Nigerian Journal of Clinical Practice*, 17(3), 309–313. <https://doi.org/10.4103/1119-3077.130231>.
 27. Zaman, S. S., Rahmani, F., Majedi, M. A., Roshani, D., & Valiee, S. (2018). A Clinical Trial of the Effect of Warm Intravenous Fluids on Core Temperature and Shivering in Patients Undergoing Abdominal Surgery. *Journal of Perianesthesia Nursing*, 33(5), 616–625. <https://doi.org/10.1016/j.jopan.2016.12.010>.
 28. Yokoyama K, Suzuki M, Shimada Y, Matsushima T, Bito H, Sakamoto A. Effect of administration of pre-warmed intravenous fluids on the frequency of hypothermia following spinal anesthesia for Cesarean delivery. *J Clin Anesth [Internet]*. 2009;21(4):242–8. Available from: <http://dx.doi.org/10.1016/j.jclinane.2008.12.010>
 29. Ansyori, & Rihiantoro, T. (2016). Preloading Dan Coloadung Cairan Ringer Laktat Dalam Mencegah Hipotensi Pada Anestesi Spinal. *Jurnal Ilmiah Keperawatan Sai Betik*, 8(2), 174–179. <https://ejurnal.poltekkes-tjk.ac.id/index.php/JKEP/article/view/161/153%0Ahttps://ejurnal.poltekkes-tjk.ac.id/index.php/JKEP/article/view/161>.
 30. Dewi, H., Rustiawati, E., & Sulastris, T. (2021). Perbedaan Tekanan Darah Antara Hidrasi Preload dengan Tanpa Preload Di Instalasi Bedah Sentral RSUD Dr. Dradjat Prawiranegara Serang. *Ilmiah Keperawatan*, 2(1), 1–8.
 31. Hamzah, A. (2022). *Kejadian Shivering pada Pasien Intra Spinal Anestesi Di Ruang OK Rumah Sakit Umum Daerah Batara Siang Pangkep*. (Skripsi). Institut Teknologi dan Kesehatan, Denpasar, Indonesia.
 32. Wódarski, B., Chutkowski, R., Banasiewicz, J., Moorthi, K., Wójtowicz, S., Malec-Milewska, M., & Iohom, G. (2020). Risk factors for shivering during caesarean section under spinal anaesthesia. A prospective observational study. *Acta Anaesthesiologica Scandinavica*, 64(1), 112–116. <https://doi.org/10.1111/aas.13462>.
 33. Masithoh, D., Mendri, N & Majid, A. (2018). Lama Operasi dan Kejadian Shivering Pasca Spinal Anestesi. *Jurnal Keperawatan Terapan*, 4(1), 14–20..
 34. Tilaar, Y. (2021). *Gambaran Tekanan Darah Sebelum dan*

- Sesudah Loading Pada Pasien Dengan Spinal Anestesi.* (Skripsi), Institut Teknologi dan Kesehatan, Denpasar, Indonesia.
35. Dadi. (2021). *Gambaran Pemberian Preload Cairan Pada Pencegahan Hipotensi Pasca Anestesi Spinal Pada Pasien Seksio Caesarea Di Instalasi Bedah sentral RSUD Bayu Asih Kabupaten Purwakarta.* (Skripsi), Institut Teknologi dan Kesehatan, Denpasar, Indonesia.
36. Sklebar, I., Bujas, T., & Habek, D. (2019). Spinal anaesthesia-induced hypotension in obstetrics: Prevention and therapy. *Acta Clinica Croatica*, 58, 90–95. <https://doi.org/10.20471/acc.2019.58.s1.13>.
37. Fantin, R., Ortner, C. M., Klein, K. U., Putz, G., Marhofer, D., & Jochberger, S. (2020). Hypotension induced by spinal anesthesia during cesarean section: Current treatment concepts. *Anaesthetist*, 69(4), 254–261. <https://doi.org/10.1007/s00101-020-00755-0>.