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RISK FACTOR FOR SURGICAL SITE INFECTION POST SECTIO CAESAREA

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ABSTRACT

Surgical site infections are infections that occur within 30 days of a surgical procedure, including infections in the post-sectio caesarea area that are common and can cause significant morbidity. This study aims to comprehensively identify and analyze the risk factors associated with post-sectio caesarea infection. The method used was a literature review with a PEO framework (Population: post-sectio caesarean section; Exposure: associated risk factors; Result: incidence of infection). Article searches were carried out systematically in official databases such as Google Scholar, Pubmed, Science Direct, and Scopus with the keywords "risk factors" AND "surgical site infections" AND "sectio caesarea", published 2018-2023. The results of the study found eight articles that showed risk factors for post-cesarean section infection, including: the number of vaginal examinations ≥ 5 times, rupture of the amniotic sac ≥ 12 hours, chorioamnionitis, long duration of labor (≥12 hours and ≥ 24 hours), estimated intraoperative blood loss of 500 to ≥ 1000 cc, intraoperative blood transfusion, emergency sectio caesarean section, operative duration of more than 1 hour, previous history of cesarean section, obesity, diabetes mellitus, hypertension, and anemia. Understanding and managing infection risk factors effectively is expected to reduce the infection rate in the surgical area, and infection prevention can be done by implementing treatment packages.

KEYWORDS *Risk factor, surgical site infections, sectio caesarea*

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INTRODUCTION

Infectious diseases related to health services or Healthcare Associated Infections (HAIs) are one of the health problems in various countries in the world, including Indonesia. In the Asian Pacific Economic Committee (APEC) forum or the Global Health Security Agenda (GHSA), infectious diseases related to health services have become one of the agendas discussed. This shows that HAIs (Healthcare Associated Infections) have a direct impact as a burden on the country's economy (Permenkes, 2017). Surgical site infection (SSI) or Surgical Site Infection (IDO) is one of the infectious diseases related to health services. According to the Centers for Disease Control and Prevention (CDC), an infection of the surgical area is defined as an infection that occurs within 30 days of a surgical procedure involving the skin, subcutaneous tissue, soft tissue, or any other part of the anatomy either as an incision or organ space (CDC, Ncezid, 2020). Sectio caesarean section is one of the most frequently performed surgeries in hospitals. Patients with sectio caesarean delivery are five times more at risk of complications compared to normal delivery (Harzif et al., 2020). One of the most common and frequent complications in sectio caesarean patients is infection of the surgical area. Post-cesarean section area infection causes a significant increase in morbidity in patients. Surgical area infections not only increase the cost of medical care but also prolong the length of patient stay and recovery.

The incidence of infection in sectio caesarean section varies widely around the world, ranging from 3-15% (Rahmawati et al., 2018). The incidence of infection in post-cesarean section surgery in Indonesia does not have exact data, so it is difficult to know. Dr. Hasan Sadikin Hospital is a national referral hospital that has an incidence rate of surgical area infections in sectio caesarean patients in 2021 of 3.39% and in 2022 until December of 3.19%. This figure exceeds the national standard set at 2% (Jubaedah et al., 2023).

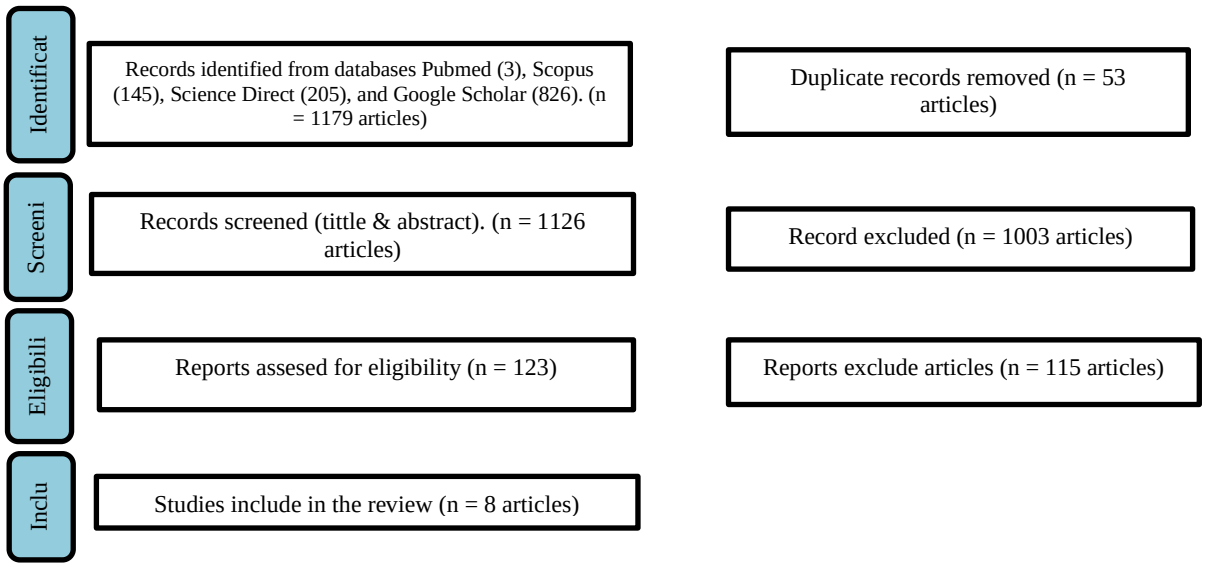
Several previous studies have identified risk factors that have the potential to affect the incidence of surgical site infections, but a thorough analysis of the existing literature is needed to better understand the factors associated with the risk of infection in sectio caesarean procedures. This study aims to conduct a systematic review of the existing literature and identify and analyze risk factors associated with post-sectio caesarean section area infection comprehensively.

RESEARCH METHOD

The author used the literature review method, with the framework of the PEO Framework, P (Population): patients after sectio caesarean surgery, E (Exposure): risk factors identified related to the incidence of infection in the sectio caesarea surgery area, O (Outcome): the incidence of infection in the surgical area.

Article searches were carried out systematically from several official databases such as Google Scholar, Pubmed, Science Direct and Scopus, using the English keywords "risk factor" AND "surgical site infections" AND "sectio caesarea". Then articles were selected according to the inclusion criteria, namely articles published from 2018 to 2023 that can be fully accessed and articles that are

in accordance with the research topic, namely regarding risk factors for post-sectio caesarean section surgery, and are cross sectional research. After the article search, the articles found are sorted out, starting from removing duplicate articles, screening abstracts, and conducting a comprehensive reading process of articles. The exclusion criterion is an article that is not fully accessible to the author. Article sorting was reported using Preferred Reporting Items for Systematic Review or Meta Analysis (PRISMA) (Wibowo & Putri, 2021).



RESULT AND DISCUSSION

Table 1. Article Findings

No	Title, Author, Year, Country	Purpose	Research Methods, Samples	Result
A1	**Judul:** *Factor associated with surgical site infection of women who undergone cesarean section in Hawassa University comprehensive specialized hospital southern Ethiopia, retrospective study* (Gashaw et al., 2022). **Penulis:** Amanu Gashaw, Shimelis Fantu, Mulate Tarekegn **Tahun**: 2022 **Negara**: Southern Ethiopia	To determine the incidence of surgical area infection and factors related to *post-sectio caesarean section surgical area infection*	**Methods:** *Descriptive cross sectional* (*Retrospective study*) **Sample:** 431 *patients with post* sectio caesarean section.	The incidence of infection in the surgical area was 11.8%. And 98% of them occur within 2 weeks. Factors associated with surgical site infection are vaginal examination ≥ 5x, ruptured membranes ≥ 12 hours, labor duration ≥ 12 hours, and estimated blood loss ≥ 500 cc [(7).]
A2	**Judul:** *Incidence, risk factors and management of post cesarean section*	To find out the incidence, risk factors and management of	**Methods:** *Observational case control retrospective*	Incidence of *post-sectio caesarea surgery infection*

	surgical site infection (SSI) in a tertiary hospital in Egypt: a five year retrospective study (Gomaa et al., 2021). **Penulis:** Khaled Gomaa, Ahmed R. Abdelraheim, Saad El Gelany, Eissa M. Khalifa, Ayman M. Yousef and Heba Hassan **Tahun:** 2021 **Negara:** Egypt	infection in the *post-sectio caesarea* surgery area in tertiary hospitals.	**Study Sample:** 828 cases of surgical area infection after cesarean section at Minia Maternity University Hospital, Egypt during the period of January 2013 to December 2017 (Five years).	by 5.34%. Significant risk factors for surgical area infection are; chorioamnionitis, rupture of membranes (*Rupture Of Membrane***),** blood loss > 1000 ml, *sectio caesarea* emergency, surgery duration > 1 hour, labor duration 24 hours, diabetes mellitus, obesity, high parity, hypertension [(8).]
A3	**Judul:** *Maternal factors are important predictors for surgical site infectionfollowing cesarean section in Northwest Ethiopian* (Ali et al., 2022). **Penulis:** Oumer Ali, Dawit Kassahun, Bayew Kelkay Rade, Asmamaw Atnafu **Tahun:** 2022 **Negara**: Ethiopia	To find out the magnitude and factors related to the infection of the surgical area.	**Metode:** *Cohort retrospective* (*cross-sectional*) **Sample:** 818 mothers who underwent cesarean section at the University of Gondar comprehensive special hospital from January 1, 2018 to January 1, 2019	The prevalence of infection in the surgical area was 12.2%. Factors that are significantly associated with surgical site infection after cesarean delivery are chorioamnionitis, diabetes mellitus, rupture of the membranes more than 12 years before a cesarean section, amniotic fluid mixed with meconium, and anemia [(9).]
A4	**Judul:** *Study of incidence and risk factors of surgical site infections in lower segment caesarean section cases of tertiary care hospital of north India* (Gupta et al., 2021) **Penulis:** Shilpi Gupta, Vikas Manchanda, Poonam Sachdev, Rajesh Kumar Saini, Minimol Joy **Year:** 2021 **Country:** North India	To determine the incidence density, risk factors and common pathogens associated with surgical site infection after lower segment caesarean section.	**Methods:** Non-interventional prospective observation **Sampel:** 611 pasien post *sectio caesarea* emergency and elective during the period of May-August 2016.	The rate of surgical area infections was found to be 10.3 per 100 surgeries, with superficial surgical area infections (66.7%) being the most common. Improper preoperative prophylactic antibiotics, anemia, intra-operative blood transfusions and comorbidities such as heart disease, hypothyroidism, chronic liver disease and kidney disease were found to be significantly associated with surgical area infections [(10).]
A5	**Judul:** *Risk factors for surgical site infection after cesarean delivery: A case-control study* (Saeed et al., 2019) **Penulis:** Khalid BM Saeed MRCPI, Paul Corcoran PhD, Mairead O'Riordan MRCOG, Richard A. Greene FRCOG, FRCPI **Year:** 2019 **Country:** Ireland	To check for the incidence and risk factors for surgical site infection after *sectio caesarea*	**Metode:** *Case control study* **Sample:** Women who had *a sectio caesarean section* The low segment during the study period was conducted at the University of Cork Maternity Hospital in Ireland.	The infection rate of the surgical area is 2%. The greatest contribution to the risk of surgical area infections is associated with maternal obesity, hypertensive disorders. There was also an increased risk in women who underwent *emergency cesarean section* and women who had ≥ 5 vaginal examinations [(11).]

A6	**Judul:** *Surgical site infection and associated factors among women underwent cesarean delivery in Debretabor General Hospital, Northwest Ethiopia: hospital based cross sectional study* (Molla et al., 2019) **Authors:** Mihretu Molla, Kiber Temesgen, Tewodros Seyoum and Mengstu Melkamu **Year:** 2019 **Negara:** Ethiopia	To assess the proportion of surgical wound infections and related factors in women undergoing cesarean delivery at Debretabor General Hospital.	**Methods:** Institutional-based *cross-sectional* study **Sample:** All women who gave birth by *cesarean section* at Debretabor General Hospital during the data collection period	The proportion of surgical wound infections in cesarean delivery is about 8%. Hypertension due to pregnancy, chorioaminitis, midline skin incisions, and postoperative hemoglobin of less than 11 g/deciliter, are significantly associated with surgical site infections [(12).]
A7	**Judul:** *Surgical site infections after cesarean sections at the University Clinical Center of Kosovo: rates, microbiological profile and risk factors* (Zejnullahu et al., 2019) **Penulis:** Vjosa A. Zejnullahu, Rozalinda Isjanovska, Zana Sejfija and Valon A. Zejnullahu **Year:** 2019 **Country:** Kosovo	To determine the incidence rate and risk factors of the surgical site in women undergoing *sectio caesarean section* at the University Clinical Center of Kosovo (UCCK), at the Obstetrics and Gynecology Clinic.	**Metode:** *Study cohort observational prospective* **Sample:** 325 women who underwent labor and scheduled *cesarean section* from January 2018 to September 2018 at the Clinical Center of the University of Kosovo, Obstetrics and Gynecology Clinic	Overall the infection rate of the surgical area was 9.85% and the median time for infection of the surgical area was the 7th day postoperatively. *Previous cesarean* section and one or more comorbidities were associated with a 7.4-fold and 8-fold increased risk of surgical area infections, respectively. A statistically significant association was found between surgical site infection and comorbidities, preoperative antibiotic use, duration of surgery and age [(13).]
A8	**Judul:** *Post cesarean section surgical site infection and associated factors among women who delivered in public hospitals in Harar city, Eastern Ethiopia: A hospital-based analytic cross-sectional study* (Alemye et al., 2021) **Authors:** Tsegaw Alemye, Lemessa Oljira, Gelana Fekadu, Melkamu Merid Mengesha **Year:** 2021 **Negara:** Ethiopia	To estimate the prevalence of surgical area infections and identify factors associated with surgical area infections	**Methods:** *Cross-sectional* analytical study **Sampel:** Wanita post *sectio caesarea* di public hospitals in Harar city, Eastern Ethiopia	The prevalence of surgical area infections is 12.3%. Factors that are significantly and positively associated with *post-sectio caesarean section* area infection include general anesthesia, *rupture of membrane*, hospitalization for more than 7 days after surgery, and blood transfusions [(14).]

Table 1 shows the results of article sorting. Out of a total of 1179 articles, 8 articles were analyzed according to the research topic based on inclusion and exclusion criteria.

Table 2. Risk Factors for Infection in the Surgical Area by Theme

Theme	Sub Theme	Article
Infection	Number of Vaginal Exams ≥ 5x	A1, A5
	Amniotic fluid rupture ≥ 12 hours	A1, A2, A3, A8
	Korioamnionitis	A2, A3, A6
Duration of Childbirth	≥ 12 Hours	A1
	24-Hour ≥	A2, A3
Bleeding and Blood Transfusion Procedures	Estimated blood loss ≥ 500 cc	A1
	Estimated blood loss ≥ 1000 cc	A2
	Intra operasi transfuses	A4
Variabel *Sectio Caesarea*	*Sectio Caesarea* Darurat	A2, A3, A5
	Durasi *sectio caesarea* > 1 Jam	A2
	History of previous *sectio caesarean* section	A7
Comorbid Complications	Obesity	A2, A5
	Diabetes Mellitus	A2, A3
	Hypertension	A2, A5, A6
	Anemia (Hb ≤ 10.9)	A4, A6

Table 2 shows the division of risk factors for surgical area infection into 5 themes, namely infection theme, duration of delivery, estimated bleeding and blood transfusion action, cesarean section variables and accompanying complications. There were 6 articles discussing the theme of infection, 3 articles discussing the theme of labor duration, 4 articles discussing the theme of bleeding estimation and blood transfusion measures, and 4 articles discussing the cesarean section variable, and 5 articles discussing the theme of comorbidities.

Discussion

Based on the analysis of the article that has been selected above, it can be concluded that the dominant risk factors for the occurrence of post-sectio caesarean area infection include:

Infection

The number of vaginal examinations ≥ 5x, the rupture of the membranes more than 12 hours before delivery and chorioamnionitis can increase the risk of infection of the surgical area in the cesarean section. Research at Hawassa University Southern Ethiopia found that amniotic fluid rupture more than 12 hours is 4.12 times more likely to develop an infection of the surgical area (Gashaw et al., 2022). Similarly to a study in a tertiary hospital in Egypt, ruptured membranes for more than 12 hours were 4.93 times more likely to develop an infection of the surgical area (Gomaa et al., 2021). In a study in Nortwest and Ireland, amniotic fluid rupture for more than 12 hours had a 2.94 and 2.27 times greater risk of developing post-cesarean section infection (Ali et al., 2022; Molla et al., 2019).

The rupture of the amniotic membrane contributes to the colonization of amniotic fluid from the normal flora of the lower genital tract and leads to surgical wounds and infection of the peritoneal cavity. When the amniotic membrane ruptures, the chances of infection in the amniotic fluid increase due to access to

vaginal microflora, and vaginal examination worsens the situation. The duration of amniotic fluid rupture more than 12 hours prior to cesarean section is an independent risk factor for surgical site infection.

This is supported by the results of research conducted at Hawassa University Southern Ethiopia and Ireland, the number of vaginal examinations ≥ 5x is 3.24 and 6.10 times greater risk of developing an infection in the surgical area. Repeated vaginal examinations increase the chances of infection due to the entry of bacteria into the surgical area. Some vaginal examinations increase the chances of iatrogenic contamination during examination (Adane et al., 2019).

Studies in Egypt and Northwest Ethiopia show that chorioamnionitis is 4.37 to 6.46 times more likely to have an infection of the surgical area. Non-sterile membranes including amniotic fluid that are infected in chorioamnionitis cause microorganisms, such as bacteria to have access to other organs and tissues at the time of cesarean section which can potentially be a source of infection after a cesarean section (Getaneh et al., 2020).

Prevention of infection of the surgical area can be done before surgery (pre-surgery). If signs of infection are found, treatment with antibiotics may be given before the day of elective surgery until the infection is declared cured.

Duration of Childbirth

A longer duration of labor may increase the risk of surgical site infection. In studies in Southern and Northwest Ethiopia and Egypt, the duration of labor ≥ 12 hours and ≥ 24 hours had a 4.05 and 1.26 to 1.78 times greater risk of developing surgical area infections. Factors related to prolonged labor can provide a greater chance for bacteria to enter and cause infection in the surgical area. The longer the labor process lasts, the higher the risk of tissue damage. Tissue damage can be an entry point for bacteria and increase the chances of infection. The long duration of labor can prolong a patient's exposure to hospital settings and medical procedures, as well as increase the risk of contamination (Adane et al., 2019).

Bleeding and Blood Transfusion Procedures

Research in Southern Ethiopia found that an estimated blood loss > 500 cc is risky 3.16 times greater to develop surgical area infections. Meanwhile, a study in Egpyt found that an estimated blood loss > 1000 cc was 2.58 times greater risk of developing post-sectio caesarean section area infection (8). Research in North India found that intraoperative blood transfusions were 5,146 times more likely to develop surgical area infections (10). Noor LL (2021) said that there was a significant association between perioperative blood transfusions and the incidence of ILO (surgical wound infection) in obstetrics and gynecology surgery with P = 0.001 (95% CI 1.92 - 110.4; RR 14.54) (Noor LL, Priambodo D, 2021).

Significant bleeding can lead to hypoxia or a lack of oxygen supply to the tissues. Hypoxia can weaken tissue resistance to infection and slow down the healing process. Blood transfusions can increase the risk of infection due to the

possibility of contamination during the transfusion process. Bleeding that requires transfusions may be associated with more complex surgical procedures or longer surgical durations, which can be an additional risk factor for the occurrence of surgical area infections (Juwita, 2020). Infection prevention measures such as good sterilization, proper bleeding management, and careful management of transfusion procedures can reduce the risk of surgical site infection in patients undergoing bleeding and transfusion procedures.

Variabel Sectio Caesarea

Childbirth through emergency cesarean section, the duration of the cesarean section exceeding 1 hour, and a history of previous cesarean section can increase the risk of infection of the area after cesarean section. Studies in Northwest Ethiopia, Egypt and Ireland showed that emergency cesarean section was 2.40, 1.08, and 3.50 times more likely to develop post-sectio caesarea surgery area infections. This is in line with research in Riau which found that surgical area infections are more common in patients who undergo cato surgery (Muttaqien et al., 2016). In sectio caesarean section, an emergency is usually associated with an urgent condition and increases the risk of infection because the procedure is performed in a fast-paced situation, which can affect sterilization and hygiene. In a study in Northwest Ethiopia, the duration of a cesarean section that lasted more than 1 hour was 2.49 times more likely to develop an infection of the surgical area. Longer surgical durations increase the risk of bacterial contamination, allow for the potential entry of microorganisms into the surgical wound, and can hinder healing.

Patients with a history of previous sectio caesarean section have different scarring and anatomical conditions, thus increasing the difficulty in surgery. This can prolong the surgery time and provide a greater chance of infection. In Kosovo, a previous history of cesarean section was associated with a 7.4 times greater risk of developing an infection of the surgical area.

After a cesarean section, especially in emergency cases, the risk of postoperative complications increases, including infection. The mother's unstable condition and emergencies can make it more difficult to handle surgical wounds. Proper infection prevention measures, including good sterilization, prophylactic antibiotics, and optimal wound care, can reduce the risk of surgical site infection in patients with these characteristics.

Comorbid Complications

Obesity, diabetes mellitus, hypertension, and anemia can significantly affect the incidence of surgical site infections (Juwita, 2020). Obesity increases the risk of postoperative infections because the added fat can create an environment that supports bacterial growth. In addition, the immune system in obese individuals tends to function less optimally. People with diabetes mellitus have a weak immune system, and tend to experience blood circulation disorders. This condition can slow down the healing process of wounds and increase the risk of infection. Diabetes

mellitus was noted as another independent risk factor for surgical site infection. This is supported by other studies conducted in Oman and India. Also similar to the findings of Ethiopia, Bahirdar and Assela. This may be due to increased glucose levels in the blood which exert various opposite effects on cellular immunity. Acute and short-term hyperglycemia affects all major components of innate immunity and interferes with the body's ability to fight infections. In cases of long-standing diabetes mellitus, vascular complications interfere with adequate tissue perfusion, and oxygenation is an important factor for the wound healing process. Hypertension or high blood pressure can affect blood circulation, so the supply of oxygen and nutrients to the surgical wound area is disrupted. This can lead to a slow healing process and increase the risk of infection.

Anemia, or low hemoglobin levels, can reduce the blood's capacity to carry oxygen. Lack of oxygen in the tissues can make it difficult to heal wounds and increase susceptibility to infection. The severity of each condition can also contribute to a higher level of risk of surgical area infection. Therefore, proper management of these factors before and after surgery is necessary to reduce the risk of infection and ensure optimal recovery.

CONCLUSION

Eight selected articles showed risk factors related to postoperative area infection such as the number of vaginal examinations ≥ 5 times, ruptured membranes ≥ 12 hours, chorioamnionitis, prolonged labor (≥ 12 hours and ≥ 24 hours), estimated intraoperative blood loss of 500 to ≥ 1000 cc, intraoperative transfusion, emergency cesarean section, duration of sectio caesarea more than 1 hour, previous history of cesarean section, obesity, diabetes mellitus, hypertension, and anemia. Understanding and managing infection risk factors effectively is expected to reduce the rate of surgical area infection, and prevention of post-sectio caesarea surgical area infection can be done by implementing bundles of care. Surgical area infection bundles are a simple set of evidence-based practices when implemented can improve reliability and increase effectiveness to lower surgical area infections by up to 60%.

REFERENCES

Adane, F., Mulu, A., Seyoum, G., Gebrie, A., & Lake, A. (2019). Prevalence and root causes of surgical site infection among women undergoing caesarean section in Ethiopia: a systematic review and meta-analysis. *Patient Safety in Surgery*, *13*, 1–10.

Alemye, T., Oljira, L., Fekadu, G., & Mengesha, M. M. (2021). Post cesarean section surgical site infection and associated factors among women who delivered in public hospitals in Harar city, Eastern Ethiopia: a hospital-based analytic cross-sectional study. *PLoS One*, *16*(6), e0253194.

Ali, O., Kassahun, D., Rade, B. K., & Atnafu, A. (2022). Maternal factors are important predictors for surgical site infection following cesarean section in Northwest Ethiopian. *Clinical Epidemiology and Global Health*, *13*, 100936.

CDC, Ncezid, D. (2020). *National Healthcare Safety Network (NHSN) Patient Safety Component Manual [Internet]*. *Available from: www.cdc.gov/nhsn*.

Gashaw, A., Fantu, S., & Tarekegn, M. (2022). Factor associated with surgical site infection of women who undergone cesarean section in Hawassa University comprehensive specialized hospital southern Ethiopia, retrospective study design. *International Journal of Surgery Open*, *44*, 100506.

Getaneh, T., Negesse, A., & Dessie, G. (2020). Prevalence of surgical site infection and its associated factors after cesarean section in Ethiopia: systematic review and meta-analysis. *BMC Pregnancy and Childbirth*, *20*, 1–11.

Gomaa, K., Abdelraheim, A. R., El Gelany, S., Khalifa, E. M., Yousef, A. M., & Hassan, H. (2021). Incidence, risk factors and management of post cesarean section surgical site infection (SSI) in a tertiary hospital in Egypt: a five year retrospective study. *BMC Pregnancy and Childbirth*, *21*, 1–9.

Gupta, S., Manchanda, V., Sachdev, P., Saini, R. K., & Joy, M. (2021). Study of incidence and risk factors of surgical site infections in lower segment caesarean section cases of tertiary care hospital of north India. *Indian Journal of Medical Microbiology*, *39*(1), 1–5.

Harzif, A. K., Wicaksono, M. D., Kallista, A., Emeraldi, M., & Pratama, G. (2020). Overview of risk factor and bacterial pattern in patient with surgical site infection after caesarean section in Ciptomangunkusumo Hospital from 2016 to 2018. *Infection Prevention in Practice*, *2*(4), 100090.

Jubaedah, S., Hermayanti, Y., & Erniati, E. (2023). Efektifitas Penerapan Bundles IDO Sectio Caesarea: Scoping review. *Indonesian Journal of Obstetrics & Gynecology Science*, *6*(2), 162–169.

Juwita, Z. (2020). Faktor-Faktor Yang Mempengaruhi Terjadinya Infeksi Luka Post Sectio Caesarea. *Darussalam Indonesian Journal of Nursing and Midwifery*, *2*(1), 21–31.

Molla, M., Temesgen, K., Seyoum, T., & Melkamu, M. (2019). Surgical site infection and associated factors among women underwent cesarean delivery in Debretabor General Hospital, Northwest Ethiopia: hospital based cross sectional study. *BMC Pregnancy and Childbirth*, *19*, 1–10.

Muttaqien, M. I., Hamidy, M. Y., & Rustam, R. P. (2016). *The Overview Of Surgical Site Infection Of Pasca Caesarean Section At Arifin Achmad General Hospital Of Riau Province 1 January–31 December 2014 Period*. Riau University.

Noor LL, Priambodo D, R. W. (2021). *Hubungan Tranfusi Darah Perioperatif dengan Kejadian Infeksi Luka Operasi (ILO) pada Pasien Bedah Obstetri dan Ginekologi Periode Tahun 2017-208 di RSUP Dr. Sardjito Yogyakarta. 2021. Universitas Gadjah Mada. Diunduh dari http://etd.repository.ugm.ac.id/*.

Permenkes. (2017). *PERMENKES RI No.27 Tahun 2017. Pedoman Pencegahan dan Pengendalian Infeksi di Fasilitas Pelayanan Kesehatan.*

Rahmawati, D., Rinda, A. C., & Wahyuni, M. (2018). *THE CORRELATION OF EARLY MOBILIZATION WITH WOUND HEALING POST SECTIO CAESAREA AT H. BADARUDDIN TANJUNG GENERAL HOSPITAL YEAR 2017*.

Saeed, K. B. M., Corcoran, P., O'Riordan, M., & Greene, R. A. (2019). Risk factors

for surgical site infection after cesarean delivery: a case-control study. *American Journal of Infection Control*, *47*(2), 164–169.

Wibowo, A., & Putri, S. (2021). Pedoman Praktis Penyusunan Naskah Ilmiah dengan Metode Systematic Review. *Depok: Departemen Administrasi Dan Kebiijakan Kesehatan Fakultas Kesehatan Masyarakat Universitas Indonesia*.

Zejnullahu, V. A., Isjanovska, R., Sejfija, Z., & Zejnullahu, V. A. (2019). Surgical site infections after cesarean sections at the University Clinical Center of Kosovo: rates, microbiological profile and risk factors. *BMC Infectious Diseases*, *19*, 1–9.