

**Research Article**

**Association between Clinical Pathway for Cesarean Section and Length of Stay in Dr. Saiful Anwar Regional Hospital Malang**

**Hubungan antara Kesesuaian *Clinical Pathway* Sectio Caesaria dengan Lama Perawatan pada Pasien di RSUD Dr. Saiful Anwar Malang**

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**ABSTRACT**

Cesarean section (C-section) is one of the main medical procedures performed at Dr. Saiful Anwar Regional Hospital in Malang. Implementing a clinical pathway (CP) as a standard of evidence-based care can influence the length of hospital stay for patients. This study aims to analyze the relationship between CP implementation and the length of hospital stay for C-section patients at Dr. Saiful Anwar Regional Hospital. The analysis was based on data from CP forms and patient medical records. The lowest CP implementation score in this study was 89.86%. A correlation test across all samples (n=97) revealed a significant relationship between CP implementation and length of stay (correlation coefficient: 0.246, p=0.008). Dividing the samples into four groups based on the most frequent diagnosis categories (placenta previa, PROM (Premature Rupture of Membranes), preeclampsia, and placenta accreta) showed significant differences in the length of stay between patients with PROM and those with preeclampsia (p=0.0001) and placenta accreta (p=0.002). The CP implementation rate for all C-section patients was above 80% and was significantly correlated with the length of hospital stay. In the future, CPs specifically designed for different C-section indications may be developed to accommodate various patient conditions.

**Keywords:** Cesarean section, clinical pathway, length of stay

**ABSTRAK**

Tindakan sectio caesaria (SC) merupakan salah satu tindakan medis utama yang dilakukan di RSUD Dr. Saiful Anwar Malang. Penerapan dari *clinical pathway* (CP) sebagai standar pelayanan berbasis bukti dapat berdampak terhadap lama perawatan pasien di rumah sakit. Penelitian ini bertujuan untuk menganalisis hubungan antara kesesuaian *clinical pathway* dengan lama perawatan pada pasien sectio caesaria di RSUD Dr. Saiful Anwar Malang. Hubungan antara kesesuaian CP dengan lama perawatan dilakukan berdasarkan data yang didapatkan berdasarkan borang CP dan rekam medis pasien. Nilai terendah dari kesesuaian CP pada studi ini adalah 89.86%. Uji korelasi pada semua sampel (n=97) bersifat signifikan (koefisien korelasi: 0.246, p=0.008). Pembagian sampel menjadi 4 kelompok berdasarkan jumlah diagnosis terbesar (plasenta previa, PROM (*Premature Rupture of Membranes*), preeklampsia, dan plasenta akreta), memberikan hasil yang menunjukkan perbedaan signifikan pada lama perawatan pasien PROM dengan pasien preeklampsia (p=0.0001) dan plasenta akreta (p=0.002). Tingkat kesesuaian CP pada semua pasien SC di RSUD Dr. Saiful Anwar Malang berada di atas 80% dan memiliki hubungan yang signifikan dengan lama perawatan pasien. Perancangan CP yang bersifat spesifik terhadap berbagai indikasi SC dapat dilakukan di masa depan untuk mengakomodasi berbagai kondisi yang berbeda pada pasien.

**Kata Kunci:** *Clinical pathway*, lama perawatan, *sectio caesaria*

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## INTRODUCTION

Hospitals are required to provide safe, high-quality, non-discriminatory, and effective healthcare services, prioritizing patient interests in accordance with hospital service standards. The primary goal of healthcare is to achieve beneficial outcomes for patients, service providers, and society. The quality of healthcare or hospital services greatly influences the achievement of desired outcomes (1).

Dr. Saiful Anwar Regional Hospital (RSSA) in Malang, a referral hospital in East Java, serves a diverse range of patients, with cesarean section (C-section) frequently performed by the Obstetrics and Gynecology Medical Staff Group. A C-section involves making an incision in the abdomen (laparotomy) and uterus (hysterotomy) to deliver the baby, typically requiring anesthesia (2).

The C-section procedure follows a clinical pathway (CP), which must be adhered to in order to ensure proper care. Misuse of the C-section technique can impact both maternal and fetal mortality rates. A clinical pathway is an integrated service model that uses evidence-based medical and nursing care standards to guide each step of patient care, resulting in measurable outcomes within a specific timeframe in the hospital. CP documents the clinical service stages for patients with specific diagnoses and is adaptable to institutional regulations (3).

Several factors influence CP implementation, one of which is the demographic characteristics of the patient. C-section patients at RSSA often present with complex morbidities, and age is a significant factor. C-section patients aged 20-35 years are more prone to complications that could affect mortality (4). High-risk maternal age can lead to premature births, stillbirths, and other mortalities that disrupt the health of the mother and the baby. Prematurity is also considered an independent risk factor that poses a specific risk to patients indicated for a C-section (5). Parity also influences CP adjustments, and high parity can pose maternal and fetal risks (6).

The patient's secondary diagnosis determines CP implementation. This affects the variation in C-section rates, especially among nulliparous women (7). Ovarian stimulation in IVF (In Vitro Fertilization) is another factor influencing C-section decisions (8). Additionally, post-operative complications, such as pain, surgical site infections, and immobility, impact CP use to prevent further issues (9-11).

Aside from the complexity of patient conditions, financial considerations, such as patient coverage through BPJS (Indonesian Social Insurance Administration Agency) or INA-CBGs (Indonesia Case-Based Groups), also contribute to CP variation, as care must align with the costs that can

be claimed. Lower patient care classes correlate with more intensive care and, paradoxically, higher costs (12).

These variations in CP implementation naturally affect patient outcomes. Adherence to post-C-section antibiotic protocols according to CP has been clinically significant in reducing the risk of surgical site infections (13). There is also a significant difference in the average length of hospital stay before and after CP implementation, and no significant difference in surgical site infections before and after CP implementation (14).

Therefore, this study aims to examine the relationship between the suitability of the clinical pathway and maternal outcomes, focusing on the length of stay and post-procedure complications for C-section patients at Dr. Saiful Anwar Regional Hospital.

## METHOD

This study was conducted at Dr. Saiful Anwar Regional Hospital, Malang, from April to May 2024. The inclusion criteria were: 1) BPJS patients undergoing cesarean section at Dr. Saiful Anwar Regional Hospital, Malang, and 2) Patients with complete medical records. The exclusion criteria were: 1) Patients not using BPJS as the payment method, 2) Patients with incomplete medical records, and 3) Patients who passed away during treatment. Data were collected using the Clinical Pathway form and medical records. Normality tests were done in each variable, showing an abnormal distribution of data in both variables. The association between clinical pathway implementation and length of stay was analyzed using Spearman's correlation test. Samples were further divided based on diagnoses, followed by normality tests. Due to the abnormal data distribution, the Kruskal-Wallis test was used, with post-hoc tests conducted when necessary.

## RESULTS

The data obtained during the study underwent descriptive and analytical statistical analyses. The results are presented in Tables 1 and 2. Table 1 shows the correlation between the length of hospital stay and the implementation of the Clinical Pathway, as tested using Spearman's correlation test, which yielded significant results ( $p=0.008$ ).

Further categorization of the length of hospital stay and Clinical Pathway implementation based on patient diagnoses is shown in Table 2. The correlation analyses between the length of stay and the implementation of the Clinical Pathway revealed no significant results for patients diagnosed with placenta previa ( $p=0.436$ ), PROM ( $p=0.47$ ), and placenta accreta ( $p=0.088$ ). In contrast, the preeclampsia diagnosis group showed a significant correlation between the length of stay and the

**Table 1. Descriptive and analytical statistical analysis of all samples**

Length of stay (n=97)	Mean±SD (Median)	3.7629±1.81873 (3)
	Normality test	$p=0.0001$
Clinical Pathway implementation (n=97)	Mean±SD (Median)	94.0805±1.30113 (94.2)
	Minimum–maximum value	89.86–98.55
	Normality test	$p=0.0001$
Correlation between length of stay and Clinical Pathway implementation	Spearman's correlation test	coefficient=0.246, $p=0.008$

**Note:** SD=Standard Deviation

Table 2. Descriptive and analytical statistical analysis based on patient diagnosis

Diagnosis	Data	Mean±SD	Normality test	Correlation test
Placenta previa (n=18)	Length of stay	3.7222±2.3466	p=0.0001	Spearman's correlation coefficient =-0.041, p =0.436
	Clinical Pathway implementation	93.8778±0.79506	p=0.0001	
PROM (n=14)	Length of stay	2.5±0.75955	p=0.0001	Spearman's correlation coefficient =-0.022, p =0.47
	Clinical Pathway implementation	93.7857±1.19686	p=0.055	
Preeclampsia (n=27)	Length of stay	4.8148±1.38778	p=0.002	Spearman's correlation coefficient = 0.468, p =0.007
	Clinical Pathway implementation	94.5763±1.68571	p=0.005	
Placenta accreta (n=7)	Length of stay	5.4286±2.07020	p=0.686	Pearson's correlation coefficient =-0.575, p =0.088
	Clinical Pathway implementation	94.4071±1.30462	p=0.062	

Kruskal-Wallis test on Clinical Pathway implementation difference between groups (p=0.091)

Kruskal-Wallis test on length of stay difference between groups (p=0.0001)

Tukey's test showed that the length of stay for PROM had a significant difference compared to the length of stay for preeclampsia (p =0.001) and placenta accreta (p=0.002).

PROM=Premature Rupture of Membranes; SD=Standard Deviation.

implementation of the Clinical Pathway (p=0.007, correlation coefficient=0.468), where higher levels of Clinical Pathway implementation are associated with shorter patient stay durations. The Clinical Pathway implementation and length of stay data from the four groups were subjected to the Kruskal-Wallis test to determine differences in the levels of Clinical Pathway implementation and length of stay among these groups. Results showed no significant differences between the groups in the Clinical Pathway implementation parameter (p=0.091); but, significant differences between the groups in the length of stay parameter (p=0.0001). Tukey's test further showed that the PROM group had significant differences in the length of stay compared to the preeclampsia and placenta accreta groups. Complications were generally found in patients diagnosed with placenta accreta, with six patients experiencing postpartum hemorrhage with a volume exceeding 1000 milliliters. Other complications, such as surgical wound infections, genitourinary disorders post-C-section, venous thromboembolism, post-C-section ileus, and post-C-section sepsis, were not found in the patient samples.

## DISCUSSION

Based on the obtained data, the average implementation of the Clinical Pathway was 94.08 (SD=1.3), with a minimum value of 89.86. This indicates that all patients received care with at least 80% Clinical Pathway implementation. The correlation analysis revealed a significant relationship between the duration of care and Clinical Pathway implementation. This suggests that the level of Clinical Pathway implementation in patients has a significant relationship with the duration of patient care.

Further data analysis, patient data were grouped by diagnosis into four categories, which were placenta previa, PROM, preeclampsia, and placenta accreta. According to the data, patients with placenta accreta had the longest average duration of care, likely due to complications such as postpartum hemorrhage with a volume exceeding 1000 milliliters. Other complications, including surgical wound infections, post-cesarean genitourinary disturbances, venous thromboembolism, post-cesarean ileus, and post-cesarean sepsis were not found in the patient sample. This suggests the

effectiveness of the Clinical Pathway implementation in preventing complications in patients.

Generally, the Clinical Pathway implementation positively impacts patient care by reducing duration and costs. This is reported in two systematic reviews and meta-analyses that investigated the relationship between Clinical Pathway implementation and patient care in general, not specific to obstetric patients (15,16). In the context of obstetric care, Clinical Pathway implementation has been reported to positively impact neonatal outcomes (17). Another study conducted in Korea reported that the implementation of multidisciplinary Clinical Pathways for managing postpartum hemorrhage reduced maternal mortality rates and improved service speed and medical evaluation (18). Conversely, research by Sunowo *et al.*, found no significant relationship between Clinical Pathway compliance and the duration and cost of care for cesarean patients. In that study, 63% of patients received care with a Clinical Pathway implementation level above 85% (19). This differs from the findings in this study, where the average Clinical Pathway implementation and all patients received care with an implementation level above 80%. This discrepancy might lead to differences in patient outcomes compared to previous studies. The varying patient diagnoses affecting cesarean section durations acted as confounding factors in this study, where patients with placenta accreta had the longest average care duration, possibly due to bleeding complications post-cesarean.

The results of this study are expected to encourage a more thorough evaluation of Clinical Pathway implementation and the development of tailored Clinical Pathways for specific cesarean indications. Future research could compare Clinical Pathway implementation levels before and after the introduction of new pathways, along with various patient outcome parameters. One limitation of this study is the wide range of indications for cesarean sections, which complicates the analysis. To address this, patients were grouped by diagnosis and cesarean indication, but this resulted in a reduced sample size. Developing targeted Clinical Pathways based on cesarean indications and diagnoses with a larger sample size in the future could provide more representative results. Furthermore, ongoing training and review of Clinical Pathways would significantly enhance the quality of care and improve patient outcomes,

particularly, considering the implementation level found in this study can still be improved.

This study found a significant relationship between the level of Clinical Pathway implementation and the duration of patient care. All patients who underwent cesarean sections at Dr. Saiful Anwar Regional Hospital experienced Clinical Pathway implementation above 80%. Therefore, it is essential to design Clinical Pathways tailored to specific

cesarean section indications to better address the unique needs of different patient conditions.

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