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Correlation Compliance with the Implementation of Standard Operational Procedures Wound Treatment, Bundles Surgical Site Infection and Blood Sugar Levels with the Incident of Operative Site Infection in Sectio Ceasarea Patients

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ABSTRACT

Non-compliance with wound care SOPs can trigger surgical site infections that result in increased morbidity and mortality, as well as increased length of care. The purpose of this study was to determine the relationship between compliance with the implementation of wound care SOPs, surgical site infection bundles, and blood sugar levels with the incidence of surgical site infections. Correlation research with a cross-sectional approach design. The independent variables of compliance with wound care SOPs, KGD, and the implementation of SSI bundles used observation. The dependent variable was the incidence of SSI. The population of all cesarean section patients was 140 respondents with a purposive sampling technique, 104 respondents were obtained, using logistic regression. There was no relationship between compliance with the implementation of wound care SOPs and the incidence of SSI (P = 0.733). There was a relationship between compliance with surgical site infection bundles and the incidence of SSI (p = 0.029). There was no relationship between blood sugar levels and the incidence of SSI (p = 0.950). There is a significant relationship between compliance with the implementation of SSI bundles and the incidence of SSI (p=0.042; OR: 0.215; CI 95%: 0.049-0.947) with a Nagelkerke's R Square value of 0.058. Compliance with SSI bundles is most related to the incidence of surgical site infection. The level of compliance with the implementation of surgical site infection bundles can reduce the incidence of surgical site infection.

Keywords: blood sugar levels, cesarean section, compliance, SSI Bundles, surgical site infection, wound care

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BACKGROUND

In today's modern era, with the increasing welfare of women, especially in urban areas, they prefer to give birth by caesarean section in addition to other indications. The increase in births by caesarean section is due to the development of indications and the reduced risk and mortality, in addition, births by caesarean section do not cause pain compared to normal or spontaneous births. However, infections are often found postpartum with caesarean section (Yanti et al ., 2021). Infections that often occur in hospitals include: Health Care Associated Infections (HAIs). Infections that occur in hospitals are classified as HAIs, one of which is surgical site infections. It is said that surgical site infections occurred in caesarean section (SC) patients after receiving treatment for more than 48 hours. The impact of Health Care Associated Infections (HAIs) results in increased morbidity and mortality, as well as increased length of treatment (Wahyuningsih, 2020).

According to the World Health Organization (WHO), the incidence of surgical site infections in the world is 5-37%, while according to National Health Scotland the incidence of surgical site infections is 15.19% (Wahyuningsih, 2020). Surgical area infections can result in death, according to the Central Disease Center data recorded in 2015 shows that the death rate directly related to surgical site infections is 3-75% in hospitals throughout the world, whereas according to one hospital study, the incidence of surgical site infections was found to be 40 cases (5.9%) from 583 caesarean sections , post-SC surgical site infections were found to be higher in England, 11.2% of cases from 715 patients and 27% when patients were hospitalized (Meo, 2019). Based on the findings in the Drupadi room at Jombang Regional Hospital, the incidence of post-SC surgical site infections for the last 3 years, in 2020 there were 21 cases of surgical site infections (4.18%) from 502 SC patients, in 2021 there were 11 cases (1.16 %) of 951 SC patients, and in 2022 there will be 11 cases (1.51%) of 727 SC patients. Based on minimum hospital service standards. provides a minimum standard limit for infections in hospitals, both surgical wound infections and nosocomial infections, < 1.5% (Permenkes number: 129/MENKES/SK/II/2008).

SC surgery is an artificial birth, in which the fetus is born through an incision in the uterus through the abdominal wall which aims to minimize the risk of birth to the mother and fetus in order to maintain the health of the mother and fetus. As a result of SC delivery, it causes incision wounds which result in bleeding, anesthesia, embolism, and even infection. Infection is one of the complications that occurs after SC due to surgical wounds (Murniati, et al ., 2020). According to the Ministry of Health, post-SC infections are caused by pathogenic microorganisms, with or without clinical symptoms, where infections that occur after SC are classified as Health Care Associated Infections, previously known as nosocomial infections, namely infections that occur while the patient is being treated in hospital (Yunita et al ., 2022).

Wound care is a technique that must be mastered by nurses. The main principle in wound care management is infection control, non-compliance in wound care due to the large number of patients, resulting in nurses being negligent in carrying out wound care actions that are not in accordance with the SOP. This results in a greater risk of complications in the post-SC wound area which can hinder the healing process. thus causing greater morbidity and mortality rates (Murniati, et al ., 2020). Based on a preliminary study conducted by researchers by observation in July 2023 in the Drupadi room at Jombang Regional Hospital, among health workers, especially nurses, it was found that 2 out of 6 nurses did not use personal protective equipment when carrying out injection procedures. 2 nurses use the same set of wound equipment for patients in turns, 2 nurses wash their hands only after contact with the patient. The success of infection control in post-SC wound care is determined by nurses' compliance in implementing wound care SOPs correctly, because the source of

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bacterial infection in the surgical area comes from the patient, nurse, team, environment and also includes instrumentation.

The risk factors that cause post-SC infection are multifactorial, including: individual factors (infection factors before surgery, physical status, diabetes, long-term steroid use, smoking and malnutrition), pre-operative factors (hospitalization, use of prophylactic antibiotics and skin disinfection before surgery), intra-operative factors (duration of surgery, wound contamination, hemostasis in the wound and tissue damage), and post-operative factors (blood sugar, wound care and observation) (Meo, 2019). Based on observations from the latest medical record data in 2022, the incidence of post-SC infections in the Drupadi ward at Jombang Regional Hospital was 20 cases (2.75%) out of 727 SC patients. Of the incidence of post-SC surgery area infections, patient factors influenced it the most, of which, of the 20 cases, the majority of SC patients experienced hyperglycemia, namely 15 patients (75%). In surgical patients, the stress response to surgery results in insulin resistance, and decreased pancreatic beta cell function causes a decrease in insulin production, thereby leading to stress-induced hyperglycemia. One of the most frequent postoperative complications in SC patients is hyperglycemia. High sugar levels affect the nervous, vascular, immune and musculoskeletal systems. Optimizing preoperative blood sugar control can suppress post-operative infections (Murniati, et al ., 2020).

The importance of preventing and controlling surgical site infections has been widely recognized. The surgical site infection prevention bundle includes antimicrobial prophylaxis, pre-operative skin antiseptic, perioperative safety checklist, normothermia, supplemental oxygen, glucose control (Yin, 2018). The implementation of SSI with good quality will improve patient safety while undergoing treatment in the Drupadi room at Jombang District Hospital and can also reduce the incidence of surgical site infections for SC patients by complying with filling out the bundle form in the medical record status of each patient after surgery is carried out in treatment. From the results of observations in July 2023 at Drupadi Regional Hospital, the process of collecting, analyzing and processing data has been carried out to interpret and disseminate information periodically. However, there are still several shortcomings in terms of the condition, filling and completeness of the SSI bundle which still has not reached the set standard, namely 80%. The representativeness of the data means that the information obtained cannot be reported properly.

Based on the description of the phenomenon above, researchers are interested in conducting research with the title "The Relationship between Compliance with the Implementation of Standard Operating Procedures (SOP) for Wound Care, Surgical Site Infection Bundles (BSSI) and Blood Sugar Levels with the incidence of Surgical Site Infection (SSI) in Sectio Caesarean Patients in the Drupadi Room at Jombang Regional Hospital".

METHODS

The research is correlational research which aims to find out what exists whether there is a relationship between compliance with wound care SOPs and the application of surgical site infection bundles , blood sugar levels and the incidence of SSI in cesarean section patients . With a cross sectional research approach design . Population all cesarean section patients in the Drupadi Room of Jombang Regional Hospital from January to July 2023, there were 140 patients per month using purposive sampling technique and sample size formula, a sample of 104 respondents was obtained with the inclusion criteria: patients who signed informed consent and were willing to be respondents, SC patients with ASA physical status I – II, aged 20 – 30 years and the operation cycle during intra to post operation, and exclusions: do not have the ability to read and write, caesarean section patients are not willing to be respondents , patients do not understand Indonesian, and patients with diabetes mellitus. The

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instrument uses observation, namely knowledge about compliance with wound care SOPs, compliance with SSI Bundles , blood sugar levels and the incidence of regional surgical infections in SC patients, then data analysis is carried out using logistic regression statistical tests with a significant standard (0.05).

RESULTS

Table 1. Frequency distribution of age, ASA status, and duration of surgery

Characteristics	n	%
Age		
< 20 years	6	5.8
20-35 years	66	63.5
> 35 years	32	30.8
ASA Status		
ASA 1	0	0
ASA 2	103	99
ASA 3	0	0
ASA 4	1	1
ASA 5	0	0
Operation duration		
More than the specified time	0	0
In accordance with the specified time	104	100

Source: Primary Data, 2024.

The results of the table description above show the characteristics of the research subjects, it is known that the majority were aged 20-35 years as many as 66 respondents (63.5%), almost all of them had ASA status 2 (patients with mild-moderate systemic disorders) as many as 103 respondents (99%).

Table 2. Description of Research Variables

Variable	n	%
Compliance with SOPs for wound care		
Not obey	66	63.5
Obedient	38	36.5
Application of surgical site infection bundles		
Not obey	8	7.7
Obedient	96	92.3
Blood glucose levels		
Hyperglycemia	65	62.5
Hypoglycemia	0	0
Normal	39	37.5
IDO incident		
There are symptoms of infection	21	20.2
There are no symptoms of infection	83	79.8

Source: Primary Data, 2024.

The results of the description of the table above show that 66 people (63.5%) partially complied with the SOP for wound care, 96 respondents (92.3%) complied with almost all surgical site infection bundles , 65 people (62.5%) mostly had hyperglycemic blood glucose levels. Most SSI cases had no symptoms of infection, 83 people (79.8%).

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Table 3. Chi-square test of the relationship between compliance with SOP for wound care, KGD, and implementation of SSI bundles with the incidence of SSI

Group Variable	IDO incident		OR	CI (95%)		p
	There are symptoms of infection	There are no symptoms of infection		Limit Lower	Limit On	
Compliance with SOPs for wound care						
Not obey	14 (21.2%)	52 (78.8%)	1,192	0.434	3,275	>0.733
Obedient	7 (18.4%)	31 (81.6%)				
Implementation of SSI Bundles						
Not obey	4 (50%)	4 (50%)	4,647	1,056	20,448	<0.029
Obedient	17 (17.7%)	79 (82.3%)				
KGD						
Hyperglycemia	13 (20%)	52 (80%)	0.969	0.361	2,598	>0.950
Normal	8 (20.5%)	31 (79.5%)				

Source: Primary Data, 2024

The table above presents a cross-tabulation of the incidence of SSI without symptoms of infection, non-compliance with wound care SOPs in 52 people (78.8%), while there were SSI infections in 14 people (21.2%). Based on bivariate analysis of SOP compliance with the incidence of SSI, the chi-square value calculated for the Odds Ratio (OR) was 1.192 with a p value > 0.733; CI(95%)= 0.434 to 3.275. This shows that there is no significant relationship between SOP compliance and the incidence of SSI.

Cross tabulation of the incidence of SSI without symptoms of adherent infection in the application of SSI bundles was 79 people (82.3 %), while there were adherent SSI infections in the application of SSI bundles as many as 17 people (17.7%). Based on bivariate analysis of the application of SSI bundles to the incidence of SSI, the chi-square calculated Odds ratio (OR) value was 4.647 with a p value <0.029; CI(95%) = 1.056 to 20.448. This shows that there is a positive and significant relationship between the implementation of SSI bundles and the incidence of SSI.

Cross-tabulation of the incidence of SSI without symptoms of infection in the blood sugar levels of SC patients with hyperglycemia was 52 people (80%), while there were infections with hyperglycemia blood sugar levels in 13 people (20%). Based on bivariate analysis of blood glucose levels and the incidence of SSI, the chi-square value calculated for the Odds Ratio (OR) was 0.969 with a p value > 0.950; CI(95%) = 0.361 to 2.598. This shows that there is no significant relationship between blood glucose levels and the incidence of SSI.

The variables in the study were: compliance with wound care SOPs, KGD, and implementation of SSI bundles with the incidence of SSI. The method used is the Pearson product moment test with a confidence level of 95% (p value = 0.05).

Table 4 Pearson product moment test of the relationship between compliance with wound care SOPs, KGD, and implementation of SSI bundles with the incidence of SSI.

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Variable Independent	Dependent	r	p-value
Compliance with SOPs for wound care	IDO incident	0.033	>0.736
Implementation of SSI bundles		0.214	<0.029
Blood glucose levels		0.006	>0.950

Source: Primary data in 2024

The table above presents a bivariate analysis of the relationship between compliance with wound care SOPs and the incidence of SSI, obtained a Pearson correlation (r) value of 0.033 with a p value >0.736. This shows that there is no significant relationship between compliance with wound care SOPs and the incidence of SSI in cesarean section patients.

In the variable compliance with the implementation of SSI bundles and the incidence of SSI, a Pearson correlation (r) value of 0.214 was obtained with a p value <0.029. This shows that there is a significant relationship between the application of SSI bundles and the incidence of SSI in cesarean section patients.

In the blood glucose level variable with the incidence of SSI, the Pearson correlation (r) value was 0.006 with a p value <0.950. This shows that there is no significant relationship between blood glucose levels and the incidence of SSI in cesarean section patients.

Table 5. Results of Logistic Regression Analysis of Wound Care SOP Compliance Variables, KGD, and Implementation of SSI Bundles with SSI Incidents

Variable Independent	OR	CI (95%) Lower limit	CI (95%) Upper limit	p
Implementation of SSI Bundles	0.215	0.049	0.947	<0.042
N Observations = 104				
-2 log likelihood = 100.74				
Nagelkerke R-Square = 0.058				

Source: Primary Data, 2024

The table above shows that the logistic regression analysis shows that there is a statistically significant relationship between the application of SSI bundles and the incidence of SSI (OR: 0.215; 95 % CI: 0.049-0.947; (p<0.042). Non-compliance in the application of SSI bundles is 0.215 times possible. resulting in symptoms of infection in caesarean section patients.

Nagelkerke's R Square value is 0.058, this indicates that the variability of the dependent variable that can be explained by the independent variable is 5.8 % while the remaining 94.2% is explained by the variability of other variables outside the three independent variables studied.

DISCUSSION

Compliance with the application of SOPs for wound care in cesarean section patients in the Drupadi Room, Jombang Regional Hospital

Non-compliance in implementing wound care SOPs (63.5%), and a small percentage complies with wound care (36.5%). According to Notoatmodjo (2018), nurses' compliance with an action, procedure or regulation that must be carried out or obeyed. However, the compliance found in the field is mostly non-compliant, this does not mean that health workers specifically nurses do not carry out wound care based on SOPs, but because the level of nurse activity is very high due to the large number of patients so that sometimes nurses are

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negligent in carrying out wound care measures. who comply with the SOP, this shows that not all nurses are disobedient, a small percentage of nursing staff are compliant in implementing the SOP for wound care in SC patients. Based on these results, it is necessary to carry out a special evaluation in implementing wound care SOPs, so that obstacles can be found that cause non-compliance in implementing wound care SOPs, which from the description above is due to the lack of nursing staff in handling SC patients, it is necessary to carry out communication with several parties concerned so that the implementation of wound care SOPs can be carried out obediently, namely by adding health workers or nurses. If this is not addressed immediately, it will have a negative impact apart from poor performance which is no less important, namely patient health, where non-compliance with the application of wound care SOPs can result in signs of infection in SC patients, hence the importance of implementing wound care SOPs, according to Amelia (2022) that the purpose of wound care is to prevent the entry of germs and dirt into the wound, prevent the spread of fluids and germs originating from the wound in the surrounding area, treat the wound with prescribed medicines and procedures, improve and speed up the wound healing process and reduce pain , and to provide a sense of security and comfort.

Compliance with the application of surgical site infection bundles in cesarean section patients in the Drupadi Room, Jombang Regional Hospital.

Compliance in implementing surgical site infection bundles (92.3%), while a small percentage of nurses were non-compliant in implementing surgical site infection bundles (7.7%). Looking at the results of this research, it can be concluded that almost all nurses in implementing the SSI bundles, most of the data components listed in the SSI prevention bundle are filled in completely by officers. Surveillance data that includes risk factors for infection is very necessary for the analysis process if a patient undergoing surgery experiences an SSI, so that the cause of infection can be identified and subsequent recommendations can be made. This is in line with Putri's research (2017), the implementation of good and complete SSI bundles is expected to reduce the incidence of surgical site infections, so that the cause of infection can be identified and subsequent recommendations can be made.

Blood sugar levels of cesarean section patients in the Drupadi Room at Jombang Regional Hospital.

The blood sugar levels of most SC patients were hyperglycemic (62%%), while a small percentage had normal blood sugar levels (37.5%). According to Fitri's research (2020), surgical trauma can cause various complaints in post-operative sufferers. Surgery is a potential and actual threat to physiological and psychological stress reactions. Trauma or surgery will cause physiological stress where metabolic and hormonal changes will occur. Hyperglycemia in SC patients can hinder the healing process in postoperative wounds. Slowly, the wound is exposed to pathogens that are dangerous to the wound, which is why post-operative wounds in post-operative patients become infected. This is in line with Murniati (2020), high blood sugar levels have a detrimental effect on the final results of surgery, and glycosylated hemoglobin reflects long-term regulation of blood glucose. It has been stated that optimizing preoperative blood sugar control can suppress postoperative infections.

The incidence of SSI in cesarean section patients in the Drupadi Room at Jombang Regional Hospital.

Surgical site infection is a complication of surgery in SC patients. In the field it was found that (79.8%) of SC patients had no symptoms of infection, while a small percentage had symptoms of infection (20.2%), this shows that of the 104 respondents there were no symptoms of infection in 83 SC patients. Most SC patients have no symptoms of SSI infection, which is influenced by several factors, namely age, where the majority of SC patients are 20-35 years old, the speed of cell repair takes place in line with a person's growth or maturity, however, the aging process can reduce the cell repair system. so it can slow

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down the wound healing process for a long time (Roberia, 2018). The ASA status of patients influences the occurrence of surgical site infections, in the field it was found that almost all of them had ASA status II, namely patients with mild-moderate systemic disorders. According to Arawal (2019), ASA status evaluates an individual's basal status including comorbidities, so the ASA score is a good predictor for SSI, where the SSI rate is significantly higher in patients with ASA II-V than ASA I. There are no symptoms of infection in SC patients because duration of surgery, where the total duration of the operation corresponds to the specified time, so that there is a possibility of exposure to viruses and bacteria which can result in infection of the surgical area. This is in line with Mooy (2020), who stated that the length of operation time is a risk factor for surgical site infections, where the operation time is more closely related to the incidence of surgical wound infections.

The relationship between compliance with the application of wound care SOPs, surgical site infection bundles, and blood sugar levels with the incidence of SSI in cesarean section patients in the Drupadi Room at Jombang Regional Hospital

In this case, compliance with the SOP for post-operative wound care is to always carry out procedures in accordance with the policies set by the hospital. The main principle in wound care management is infection control because infection inhibits the wound healing process, causing greater morbidity and mortality rates (Murniati et al., 2020). According to research by Safarudin at al., (2020), there is a significant relationship between nurse compliance in implementing Wound Care SOPs and the incidence of post-op infections. However, in the field it was found that 52 people (78.8%) had SSI cases without symptoms of infection, non-compliance with wound care SOPs, while 14 people (21.2%) had SSI infections. Based on the analysis, it was found that there was no statistically significant relationship between compliance with the implementation of wound care SOPs and the incidence of SSI in SC patients due to the p-value (0.733), whereas based on the frequency distribution, the majority of PC patients had no symptoms of infection, this was due to characteristic factors. In general, respondents, where SC patients are 20-35 years old, the speed of cell repair takes place in line with a person's age growth or maturity, the overall duration of surgery for PC patients, the duration of surgery is in accordance with the specified time, so there is a possibility of being exposed to viruses and bacteria which can result in surgical site infections.

Surgical site infection bundles are a structured way to improve the care process and patient outcomes, generally only three to five, carried out collectively and reliably, have been proven to improve outcomes to prevent one SSI, this has been found in the field that the incidence of SSI without symptoms of infection 79 people (82.3 %) were compliant in implementing SSI bundles, while 17 people (17.7%) were compliant in implementing SSI bundles. The results of the analysis show that there is a statistically significant relationship between the application of SSI bundles and the incidence of SSI in SC patients due to the p-value (0.029). According to Koek et al., (2017), quoted in Wahyuningsih's (2020) research, compliance In implementing surgical site infection bundles, it is considered to contribute to reducing the incidence of surgical site infections. Likewise, a reporting and feedback system can increase awareness among health care professionals of the importance of their role in preventing surgical site infections and patient safety.

Hyperglycemia that occurs after surgery is It is very important for the problem to be resolved immediately because it can cause high risk conditions, namely infection. This condition favors bacterial growth and compromises fibroblast function and collagen synthesis, impairing wound healing and increasing the incidence of postoperative wound infections. However, the results of the study showed that the incidence of SSI had no symptoms of infection in the blood sugar levels of SC patients with hyperglycemia as many as 52 people (80%), while there were infections with hyperglycemia blood sugar levels in 13 people (20%). From the results of the analysis, there is no significant relationship between blood glucose levels and

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the incidence of SSI in SC patients due to the p-value (0.969). The results of this study are not in line with Rita's research (2018), an increase in blood sugar levels so that the healing process in post-operative wounds operation becomes slow. It takes a long time for a patient's post-operative wound to heal and this is coupled with the wound being exposed to pathogens that are dangerous to the wound, which is why post-operative wounds in post-operative patients become infected. This is due to ASA II status, namely patients with mild-moderate systemic disorders, where the higher the patient's ASA status, the more severe the patient's systemic disorders will be. This causes the response of the body's organs to the drug or anesthetic agent to be slower, resulting in delays in the wound healing process after SC surgery.

In the analysis of the relationship, there was a statistically significant relationship between compliance with the application of SSI bundles and the incidence of SSI in SC patients, there were no signs and symptoms of infection (p=0.042), the more adherent to the application of SSI bundles, 0.215 times there were no signs and symptoms of infection, while the Nagelkerke's R value Square is 0.058, this indicates that the variability of the dependent variable that can be explained by the independent variable is 5.8%, while the remaining 94.2% has no signs and symptoms of infection due to the characteristics of SC patients, namely age, ASA status and duration of surgery. Compliance with the application of SSI bundles has an influence or relationship with the incidence of SSI in SC patients when compared with compliance with wound care SOPs and blood sugar levels, this is because in applying SSI bundles as soon as possible before surgery, namely giving prophylactic antibiotics, checking body temperature must be in normal condition , and maintain normal blood sugar levels, so that there is a high probability of no postoperative symptoms and signs of infection. This is in line with research conducted by Bert et al , (2017) which was quoted in Wahyuningsih's (2020) research, that the level of compliance in implementing surgical site infection bundles can reduce the incidence of surgical site infections, while non-compliance in implementing SSI bundles is due to the surgical team's compliance in implementing the bundles. surgical site infections include, lack of knowledge, low motivation, missing equipment and lack of leadership.

CONCLUSION

Most of the SSI incidents had no symptoms of infection with non-compliance with wound care SOPs, 52 people (78.8 %), 79 people (82.3 %) complied with the implementation of SSI bundles. Almost all SSI cases had no symptoms of infection with the blood sugar levels of SC patients hyperglycemia as many as 52 people (80%). There is no relationship between compliance with the application of wound care SOPs and the incidence of SSI in cesarean section patients in the Drupadi Room, Jombang Regional Hospital (P=0.733). There is a relationship between compliance with surgical site infection bundles and the incidence of SSI in cesarean section patients in the Drupadi Room, Jombang Regional Hospital (p=0.029). There was no relationship between blood sugar levels and the incidence of SSI in cesarean section patients in the Drupadi Room, Jombang Regional Hospital (p=0.950). There is a significant relationship between compliance with the implementation of SSI bundles and the incidence of SSI in SC patients (p=0.042; OR: 0.215; 95 % CI: 0.049-0.947) with a Nagelkerke's R Square value of 0.058.

Compliance with the team of health workers, especially nurses and doctors, is highly expected in minimizing surgical site infections in SC patients. It is hoped that the research results can be a contribution to the field of health research, especially in preventing and treating surgical site infections in SC patients, so that the incidence of SSI in patients can be minimized. S.C.

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