PATIENT-RELATED FACTORS THAT INFLUENCE SSIS AMONG POST LAPAROTOMY PATIENTS IN THE SURGICAL UNIT AT THIKA LEVEL 5 HOSPITAL KIAMBU COUNTY

Abstract

A surgical site infection (SSI) is a common complication of surgical procedures and represents one form of healthcare-associated infection (HAI) acquired by patients before, during, or after receiving surgical intervention. It's the second most common HAI, and it's responsible for the rise of antibiotic resistance and the deaths of millions of people every year. This research examined patients done laparotomy procedure at Thika Level 5 Hospital (TL5H), which forms a good representation of study population to identify risk factors for surgical site infections. The research took the form of analytical cross-sectional study. Post laparotomy Patients at the hospital throughout the research period made up the study's primary population. One hundred and ninety six patients from the gynecology and surgery departments were selected at random. Quantitative data on patient-related variables and institutional factors as predictors of SSIs was collected using a questionnaire designed in accordance with CDC guidelines and SSI Surveillance checklist tool. Pretesting of data tools were conducted in Kiambu level 5 hospital in Kiambu County to ensure validity and reliability of data tools. Data was analyzed using the Statistical Program for the Social Sciences (SPSS) computer program, version 25.0, and participants' privacy was protected at all times. The study found that factors such as delay in seeking treatment, age, nutritional status, smoking habits, existing medical conditions, transfusion after surgery, and length of hospital stay before surgery were significantly associated with SSIs. Institutional factors such as timing of prophylaxis antibiotics, length of hospital stay after surgery, hygiene practices observed by healthcare workers, and the duration of the operation influence the incidence of SSIs significantly. The healthcare facilities should implement strict protocols for pre-operative and post-operative care, including timely administration of prophylaxis antibiotics. Healthcare workers should adhere to proper hygiene practices, including hand hygiene and the use of personal protective equipment. Patients should be educated on the importance of seeking timely medical care and adopting healthy lifestyle practices to reduce the risk of SSIs. The results of this research will be published and utilized to close the knowledge gaps that contribute to the high morbidity and mortality rates associated with SSIs after laparotomy.

1.0 Introduction

1.1 Background of the Study

Infections acquired after admission to a hospital are known as healthcare-associated infections (HAIs). These infections are picked up during hospitalization and start showing

symptoms within 48 hours after admission or 30 days. They pose a risk to patient safety and are among the top ten leading causes of mortality in the United States (1).

HAIs spread rapidly in healthcare facilities due to the high concentration of frail patients whose immune systems have been compromised further by the presence of surgical procedures that circumvent the body's natural protective barriers.

Up to 20% of patients in the African context develop postoperative wound infection, making further surgery risky for their health (2). WHO's guidelines on SSI prevention underpins the IPC program as essential components for the prevention of SSIs. Implementing clinical care practice standards and utilizing a multimodal improvement method may significantly reduce the prevalence of SSIs. However, due to the lack of proper infrastructure and well-established infection prevention and control (IPC) programs, no nation has been able to prevent SSIs successfully (2).

(3) performed observational research on the risk variables and death rate after elective and emergent laparotomy operations in an ICU population of 899 patients, 112 of whom required immediate surgery. The mortality rate was 32% for emergency laparotomies and 4.7% for elective surgeries. Cancer patients and those with hepatic problems had a disproportionately high death rate.

The risk of surgical site infection (SSI) is particularly significant during emergency laparotomy (EL), which is done when the patient needs immediate surgery for an acute abdominal ailment. Mortality rates are unfortunately significant for individuals with comorbidities and advanced age after an EL (4).

1.2. Problem Statement

According to the CDC assessment of HAIs in 2015, SSIs related to inpatient procedures are 110,800 globally, which raises many health concerns. Despite significant developments in infection control procedures, including improved sterilizing methods, enhanced surgical

skills, and the availability of antibiotic prophylaxis, post-laparotomy SSIs continue to be a leading cause of death and extended hospital stays. Twenty percent of all HAIs are SSIs, and these infections carry a mortality risk multiplier of two to eleven, with seventy-five percent of SSI-related fatalities being attributed to the infection itself. It is the most expensive form of HAI, with an annual cost of $3.3 billion, a 9.7-day increase in hospital stays, and an additional $20,000 in costs per admission (5).

(6) performed a randomized controlled experiment to determine the financial effect of SSIs following elective laparotomy. The authors studied 456 patients at a German hospital and compared subcutaneous wound irrigation with polyhexanide and normal saline for 30 days after surgery. The total SSI rate was 28.2%, and the cost of inpatient care was much higher for those with SSIs ($19,703) than those without SSIs ($13,276). The research found that the cost of treating SSIs after elective laparotomy was much higher, which is why prevention is essential.

2.0 Literature Review

2.1 Patient-Related Factors

2.1.1 Age

(7) conducted a prospective analysis on 285 Harare, Zimbabwe patients to assess risk factors for abdominal surgical site infections (SSIs). The study revealed a high SSI rate of 26%, with older age emerging as a significant predictor of infection susceptibility. Among HIV-positive individuals, the SSI rate escalated to 52%, underscoring the heightened vulnerability of immunocompromised older patients to postoperative infections.

Advanced age is associated with physiological changes that increase the risk of SSIs. Older adults often experience compromised immune responses, reduced skin integrity, and slower wound-healing processes, all contributing to a higher likelihood of infections following surgery. The presence of comorbidities such as diabetes mellitus, hypertension, and

cardiovascular disease further exacerbates these risks by impacting overall health and immune function.

Furthermore, prolonged hospital stays and increased healthcare utilization among older surgical patients highlight the significant economic and resource burden associated with managing SSIs in this demographic. Effective infection prevention strategies tailored to the unique needs of older adults, including meticulous wound care, antimicrobial stewardship, and enhanced surveillance for early detection of infections, are crucial for optimizing surgical outcomes.

The findings from Muchuweti and Jönsson's study emphasize the imperative for healthcare providers to adopt age-specific approaches in perioperative care to mitigate SSIs effectively. By addressing age-related vulnerabilities and implementing targeted interventions, healthcare teams can enhance patient safety, improve recovery outcomes, and reduce healthcare costs associated with postoperative complications.

2.1.2 Chronic Health Conditions

(8) conducted a comprehensive retrospective examination involving 234 patients at an acute-care surgical hospital in the United States to investigate how chronic health conditions contribute to surgical site infections (SSIs) risk. Their study highlighted several key findings. Firstly, patients with chronic obstructive pulmonary disease (COPD) were notably susceptible to SSIs. COPD can compromise respiratory function, leading to decreased tissue oxygenation, crucial for wound healing. This physiological impairment may exacerbate the risk of infections by impairing local immune responses at the surgical site.

Moreover, the study identified that individuals requiring long-term mechanical ventilation had a significantly elevated SSI risk. This increased risk is likely multifactorial, involving prolonged hospital stays, invasive procedures associated with ventilation support, and the potential introduction of pathogens through ventilatory equipment. The immunomodulatory

effects of mechanical ventilation may also play a role in predisposing these patients to infections.

Another important finding was the association between blood transfusions and higher rates of SSIs. While the exact mechanism is complex, it is speculated that transfusions may impair immune function or introduce infectious agents, thereby increasing the likelihood of postoperative infections.

Additionally, ICU hospitalization emerged as a significant risk factor in the study. Patients in intensive care units are often exposed to a higher burden of hospital-acquired pathogens, and the complex medical interventions required in ICUs can further challenge immune defenses and increase susceptibility to SSIs.

These findings underscore the critical need for proactive management of chronic conditions preoperatively. Strategies include optimizing respiratory function in COPD patients, minimizing invasive procedures where possible, and implementing rigorous infection control protocols in ICUs. By addressing these factors, healthcare providers can reduce the incidence of SSIs and improve outcomes for surgical patients with chronic health conditions (9).

2.1.3 Nutritional Status

(10) conducted a cross-sectional study focusing on 112 patients who underwent elective laparotomies in India, aiming to assess the relationship between nutritional status and the incidence of surgical site infections (SSIs). The study specifically examined the role of pre-surgery total blood protein levels as an indicator of nutritional status and its impact on infection risks.

The findings underscored the critical influence of nutritional status on postoperative outcomes. Low levels of total blood proteins, indicative of poor nutritional status, were significantly associated with a higher incidence of SSIs. Adequate protein intake is essential for maintaining immune function, tissue repair, and wound healing. Thus, deficiencies in

protein levels can impair these vital functions, compromising the body's ability to combat infections effectively at the surgical site.

Moreover, malnutrition, characterized by deficiencies in essential nutrients such as vitamins and minerals, further exacerbates the risk of SSIs. Poor nutritional status can lead to weakened immune defenses, delayed wound healing, and increased infection susceptibility. This is particularly relevant in surgical patients, where the stress of surgery and the metabolic demands of healing necessitate optimal nutrient intake for optimal recovery.

The study by (10) highlights the importance of preoperative nutritional assessment and intervention strategies in reducing the risk of SSIs. Healthcare providers should prioritize nutritional optimization in surgical candidates, including dietary counseling, supplementation as needed, and addressing underlying nutritional deficiencies. By enhancing nutritional status before surgery, healthcare teams can mitigate the risk of SSIs and improve overall surgical outcomes for patients undergoing elective laparotomies. This proactive approach supports recovery and reduces healthcare costs associated with postoperative complications.

Optimizing nutritional status through targeted interventions is crucial for enhancing immune function, promoting wound healing, and reducing the incidence of SSIs in surgical patients. Future research and clinical practices should continue to emphasize integrating nutritional care into perioperative management to achieve better outcomes and patient satisfaction (10).

3.0 Material and Methods

To investigate the causes and rates of SSIs in patients who have had laparotomies at Thika Level 5 Hospital in Kiambu County, Kenya, researchers used analytical Cross-sectional study design.The hospital chosen for the research was Thika level 5, which is in the Thika Sub County of Kiambu County.All hospital patients who underwent laparoscopic procedures throughout the research period were included. Roughly 60% of all major procedures performed in the surgical departments are laparotomies, accounting for about 110 cases each month. 68 nursing staff were deployed in the surgical and gynecological wards.

Andrade (2020) suggests that researchers use correct sampling techniques before entering a study. Therefore, it is essential that the sample accurately reflects the whole population.

Since the number of laparotomy patients at TL5H has yet to be discovered, the researcher applied Cochran's (1977) calculation for an infinite population.Given the lack of reported SSI rates in hospitals, the researcher used a value of 0.5 as a proportion of patients affected by SSI.

Approximately 110 laparotomies are performed each month in surgical and gynecology departments. The study was expected to last three months, and the researcher had estimated that 330 laparotomies would be performed during that time:

The sample size was increased by 10%, to 196 patients, to account for dropouts and minimize bias.As stated by the CDC (2016), patient-based surveillance is essential for SSI monitoring. Medical records, surgical clinics, patient files, laboratory and imaging, patient questionnaires through mail and telephone, and other post-discharge surveillance measures may be used to track down and investigate SSIs after patients have been released from the hospital.Mount Kenya University's Ethical Research Committee (ERC), Kenya's National Commission for Science, Technology, and Innovation (NACOSTI), and Kiambu County's Health Management Team (CHMT) granted permission for the study could.

4.0 DATA ANALYSIS AND PRESENTATION OF FINDINGS

4.1 Demographic Data

Surgical Male ward had 72 patients (44.7 of the total). Surgical Female 2 had 41 patients, making up 25.5% of the total, indicating a significant number of female surgical patients. Gynecological Female 6 had 48 patients, representing 29.8% of the total.

Table 1: Demographic Data

Test Item	Category	Frequency	Percent
Ward/Unit	Surgical Male	72	44.7
	Surgical Female 2	41	25.5
	Gynecological Female 6	48	29.8
Age	25-34	16	9.9
	35-44	32	19.9
	45-54	64	39.8
	Above 55 years	49	30.4
Gender	Male	76	47.2
	Female	85	52.8
Education	Primary	49	30.4
	Secondary	68	42.2
	Tertiary	44	27.3
Length of hospital stay	below 3 days	10	6.2
	4-7 days	119	73.9
	Over 7 days	32	19.9

The ward/unit represented in pie chart below;

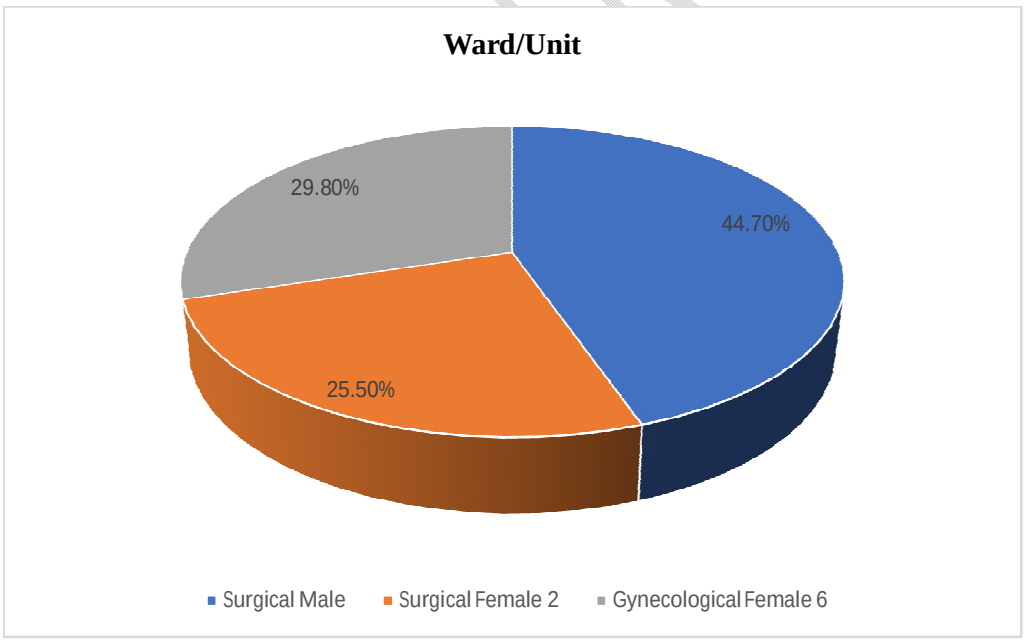

Figure 1: Ward/Unit of the respondent

In terms of the age of patients ranged from 25 years to above 55, showing a wide age distribution. This was graphically presented on the column bar below;

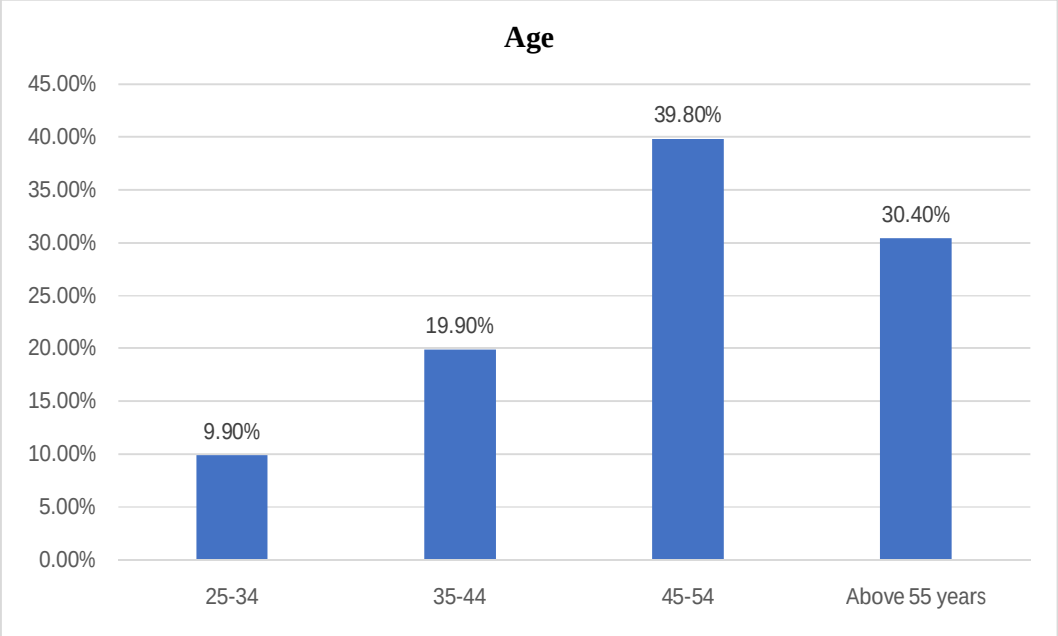

Figure 2: Age of the respondent

4.2 Patient-related Factors that Influence SSIs among Post Laparotomy Patients.

Indication

The second objective was to determine patient-related Factors that Influence SSIs among Patients done Laparotomy and the results were presented as below;

4.2.1 Indication/ surgical diagnosis that led to laparotomy

Cross-tabulation was performed on the data on the indications or surgical diagnoses that led to laparotomy. Their corresponding rates of surgical site infection (SSI) provide a detailed view of how different conditions are associated with SSIs. This information can be critical for understanding patterns and improving surgical care and infection control practices.

Findings indicated that peritonitis had the highest SSI rate at 25.0%, indicating a significant risk of infection and requiring rigorous infection control measures. Intestinal obstruction also had a high SSI rate of 20.8%, suggesting the need for careful postoperative management. Blunt abdominal trauma, hernia, and uterine fibroids had no SSIs reported, which could reflect effective surgical techniques and perioperative care specific to these conditions.

Conditions such as appendicitis (8.3%), benign tumors (4.2%), and ovarian cystic conditions (12.5%) showed moderate SSI rates. Perforated PUD (16.7%) and other conditions (12.5%) had slightly higher SSI rates, though still lower than those for peritonitis and intestinal obstruction. These results suggest that patients undergoing surgery for peritonitis (66.7) and intestinal obstruction (35.7%) are at a higher risk for developing SSIs compared to other indications. Conversely, surgeries for blunt abdominal trauma, hernia, and uterine fibroids appear to have the lowest risk for SSIs.

This cross-tabulation highlights the variability in SSI rates depending on the surgical indication for laparotomy and underscores the importance of targeted infection prevention strategies, tailored postoperative care, and continuous monitoring to mitigate the risk of SSIs, thereby improving patient outcomes.

Table 2: Cross tabulation on the Indication/ surgical diagnosis that led to laparotomy

Indicator			SSI Yes	No	Total
Indication	Intestinal obstruction	F	5	9	14
		%	20.8%	6.6%	8.7%
	Brunt abdominal trauma	F	0	12	12
		%	0.0%	8.8%	7.5%
	Appendicitis	F	2	23	25
		%	8.3%	16.8%	15.5%
	Benign Tumors	F	1	12	13
		%	4.2%	8.8%	8.1%
	Peritonitis	F	6	3	9
		%	25.0%	2.2%	5.6%
	Hernia	F	0	28	28
		%	0.0%	20.4%	17.4%
	Perforated PUD	F	4	8	12
		%	16.7%	5.8%	7.5%
	Uterine fibroids	F	0	17	17
		%	0.0%	12.4%	10.6%
	ovarian cystic condition	F	3	18	21
		%	12.5%	13.1%	13.0%
	Others (Cancers of blander, cervix, endometrium and ectopic pregnancy)	F	3	7	10
		%	12.5%	5.1%	6.2%
Total		F	24	137	161
		%	14.9%	85.1%	100.0%

Source Field Data (2024)

The findings from this study are consistent with previous research examining patient-related factors influencing SSIs among surgical patients. An observed similar trend in SSI rates across different surgical indications, with conditions such as peritonitis and intestinal obstruction presenting higher SSI risks.

4.2.2 Rating on Patient-related Factors that Influence SSIs among Post Laparotomy Patients.

Table 5 offers valuable insights into the patient-related factors influencing the occurrence of surgical site infections (SSIs) in individuals who underwent laparotomy. Each test item within the table addresses different variables, such as delays in seeking medical attention, blood glucose levels, type of surgery, wound category, smoking status, medical conditions, and transfusions, shedding light on their potential impacts on SSIs.

Delays in seeking medical attention were prevalent among patients, with 87 (54.0%) experiencing delays before undergoing laparotomy, potentially correlating with an increased risk of SSIs, especially among those delaying for more than six weeks, as noted in 36 cases (42.9%). Blood glucose levels were mainly within the normal range for most patients (81, 50.3%), although monitoring gaps were evident in 76 cases (47.2%). Emergency surgeries were more common (85, 52.8%) than elective surgeries (76, 47.2%), possibly indicating higher SSI risks due to the urgency and compromised patient health associated with emergency procedures.

Wound categorization revealed that Class 1 wounds (clean) were predominant (89, 55.3%), followed by Class 2 (clean-contaminated) wounds (52, 32.3%), suggesting varying degrees of wound contamination that could influence SSI rates. Smoking status, with only a minority of patients being smokers (24, 14.9%), hinted at a potential association between smoking and increased SSI risk, warranting further investigation. The results also indicated that there is a statistically significant relationship between co-morbidity and the incidence of SSIs. Moreover, underlying medical conditions were present in a subset of patients (32, 19.9%), with hypertension being the most prevalent (22, 68.8%), followed by diabetes, ulcers, and dysfunctional uterine bleeding (DUB. Similarly, (11) performed a prospective analysis, and the results indicated an association between co-morbidity and SSIs.

Finally, a considerable proportion of patients received transfusions (40, 43.0%), possibly indicative of more complex surgical procedures or underlying medical conditions necessitating blood transfusions.

Findings provides a comprehensive overview of patient-related factors and their potential implications for SSI development following laparotomy. Understanding these factors is crucial for identifying high-risk patients, implementing targeted preventive measures, and optimizing postoperative care to reduce SSI occurrences and enhance patient outcomes

Table 3: Rating on Patient-related Factors that Influence SSIs among Post Laparotomy Patients.

Test Item		**F**	**%**
Delay	Yes	87	54.0%
	No	74	46.0%
How long if they delayed	Less than a week	20	23.8%
	2- 3 weeks	12	14.3%
	above 6	36	42.9%
	4-6 weeks	8	9.5%
	one-2wks	8	9.5%
Total		**87**	**54.0**
blood Glucose Levels	Normal range	81	50.3%
	Hyperglycemia	4	2.5%
	Hypoglycemia	0	0.0%
	not done	76	47.2%
Type of Surgery	Emergency	85	52.8%
	Elective	76	47.2%
Wound category	Class 1: Clean	89	55.3%
	Class 2: Clean-contaminated	52	32.3%
	Class 3: Contaminated	12	7.5%
	Class 4: Dirty	8	5.0%
Cigarettes smoking	Yes	24	14.9%
	No	137	85.1%
Medical Condition	Yes	32	19.9%
	No	129	80.1%
Which medical condition if yes	Diabetes	8	25.0%
	Cancer	0	0.0%
	Hypertension	22	68.8%
	HIV	0	0.0%
	Ulcers	1	3.1%

	DUB	1	3.1%
Total		**32**	**100.0%**
Transfused	Yes	40	43.0%
	No	53	57.0%

Source Field Data (2024)

4.2.3 Inferential Analysis on the patient-related Factors that Influence SSIs among Post Laparotomy Patients.

This section presents the inferential analysis of patient-related factors that influence surgical site infections (SSIs) among patients who have undergone laparotomy, with the results summarized in Table 6. This table displays the outcomes of Chi-square tests, which help determine whether there are significant associations between various patient-related factors and the incidence of SSIs.

The Chi-square test results indicate statistically significant associations between the patient-related factors and the incidence of SSIs among patients who underwent laparotomy. The highly significant $\chi 2 = 0.000$ across different tests (Pearson et al. and Linear-by-Linear Association) suggest that the patient-related factors studied substantially impact the likelihood of developing SSIs.

This inferential analysis highlights the importance of considering various patient-related factors in clinical settings to identify and mitigate SSI risks. The significant associations underscore the need for targeted interventions based on these factors to improve surgical outcomes and reduce infection rates.

Table 4: Chi square test on the patient-related Factors that Influence SSIs among Post LaparotomyPatients.

Chi-Square Tests			
	Value	**df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	37.090[a]	10	.000
Likelihood Ratio	31.497	10	.000
Linear-by-Linear Association	12.222	1	.000
N of Valid Cases	161		

Source Field Data (2024)

The prevalence of delays in seeking medical attention before surgery aligns with findings from studies by (12), which identified delays as a significant risk factor for postoperative infections.

Furthermore, the association between blood glucose levels and SSI risk corroborates findings from research by (13), highlighting the importance of glycemic control in reducing postoperative complications. Similarly, the significance of wound category and type of surgery in influencing SSIs echoes conclusions from studies by (14), emphasizing the need for tailored preventive strategies based on surgical and wound characteristics.

Moreover, recent studies have highlighted the role of other patient-related factors, such as nutritional status, immunocompromised conditions, and antibiotic prophylaxis, in influencing SSI rates. Incorporating insights from these studies into clinical practice can further enhance the understanding of SSI risk factors and inform targeted preventive measures.

By aligning with and expanding upon previous research, this study contributes to a growing body of evidence on patient-related factors influencing SSIs among laparotomy patients, providing valuable insights for clinicians and healthcare professionals to optimize infection prevention strategies and improve surgical outcomes.

5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

The study comprehensively investigates patient-related factors influencing surgical site infections (SSIs) among laparotomy patients. It identifies several key variables contributing to SSI risk. The most common indications for laparotomy were hernia (17.4%), appendicitis (15.5%), and ovarian cystic conditions (13%). Preoperative preparations included vital sign observation (95.7%), prophylactic antibiotics (87.6%), and blood glucose monitoring.

Delays in seeking medical attention were prevalent, with over half of the patients experiencing delays before laparotomy. A significant relationship was found between delays and SSIs, with 41.3% of patients waiting more than six weeks before treatment, which was associated with higher SSI risk. Blood glucose levels were generally within normal ranges, but monitoring gaps in nearly half the cases suggested opportunities for better perioperative glycemic control.

The predominance of emergency surgeries over elective ones highlighted increased SSI risks due to compromised health status and systemic inflammation in urgent cases. Wound categorization revealed that while most wounds were clean, clean-contaminated wounds indicated potential microbial exposure. Low smoking rates among the cohort hinted at its possible association with increased SSI risk, corroborating previous research linking tobacco use to impaired wound healing.

Comorbidities like hypertension and diabetes were notable, as they impact immune responses and tissue healing, increasing SSI susceptibility. Transfusions, necessary in specific

scenarios, indicated more extensive surgical procedures or underlying pathologies, contributing to infection risks. The inferential analysis in Table 6 emphasizes the importance of considering these factors in risk stratification and preventive interventions.

This study enhances understanding of the complex interplay between patient factors and SSI outcomes, supporting the need for individualized infection prevention and perioperative care. The insights can inform evidence-based practices to optimize surgical care, reduce SSI incidence, and improve patient outcomes.

5.2 Conclusion

The overall incidence of SSIs among patients undergoing laparotomy was thus 14.9%. Most SSIs occurred within 0-7 days post-operation, with symptoms including swelling/inflammation, pain/tenderness, fever, and pus drainage. The findings suggest that both patient-related and institutional-related factors play crucial roles in the occurrence of SSIs among patients undergoing laparotomy. Factors such as delay in seeking treatment, age, nutritional status, smoking habits, existing medical conditions, transfusion after surgery, and length of hospital stay before surgery were significantly associated with SSIs. Institutional factors such as the timing of prophylaxis antibiotics, length of hospital stay after surgery, hygiene practices observed by healthcare workers, and the duration of the operation influence the incidence of SSIs significantly. Strategies to address these factors can potentially reduce the incidence of SSIs and improve patient outcomes.

5.3 Recommendations

Based on the findings, the following recommendations are suggested:

i. Thika level 5 hospital should implement strict protocols for pre-operative and post-operative care, including timely administration of prophylaxis antibiotics. Given that only the gynecological ward followed prophylaxis antibiotics protocols, it is necessary to standardize these protocols across all surgical units. Clear guidelines should be

established regarding the appropriate use of prophylactic antibiotics to prevent surgical site infections. This can also be achieved through regular training sessions, audits, and supervision to ensure that all staff members understand and follow IPC guidelines.

ii. Healthcare workers should adhere to proper hygiene practices, including hand hygiene and the use of personal protective equipment. Given the deficiencies in environmental cleaning protocols observed in two wards and since all wards did not adhere to surgical hand scrub protocols, efforts should be made to reinforce the importance of proper hand hygiene among healthcare workers. Training sessions and reminders should be provided to ensure consistent adherence to hand hygiene protocols before surgical procedures. Regular monitoring and feedback mechanisms should be established to maintain cleanliness and prevent the spread of infections.

iii. The management of Thika level 5 hospital should increase training on SSI surveillance and wound care. Since only the gynecological ward had a trained nurse on SSI, and only the male surgical ward had a nurse trained on wound care, efforts should be made to provide training to nurses in all surgical units. Training programs should focus on SSI surveillance, wound care management, and infection prevention practices to improve patient outcomes. While most wards had one nurse trained on IPC, additional training should be provided to ensure sufficient coverage and expertise in infection prevention and control measures.

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