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ORIGINAL ARTICLE

Incidence of Surgical Site Infections and its Associated Factors: A Cross Sectional Study

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ABSTRACT

Aim: To determine the incidence of surgical site infections and its associated factors
Study design: Cross sectional study
Place and duration: This study was conducted at Bolan Medical Complex Hospital Quetta Pakistan from January 2020 to February 2021.
Methodology: Patients who underwent general surgical procedures were included in the study. Pus or purulent discharge from the incision, together with pain, any two cardinal symptoms of inflammation were used to assess surgical site infections. For data entry and analysis, SPSS version 21 was utilized. A P-value of less than 0.05 was considered statistically significant.
Results: Following the operation, 240 people were included in the current study. The average age of the study participants was 39.33 ± 2.74 years. Infections at the surgical site were found in 9.16 % (n=22) of the patients. As participants' age increases, the surgical site infection rate rises significantly. Diabetes was found to be substantially linked to surgical site infection (P < 0.001). According to wound categorization, infection rates were higher in filthy wounds, 22.22 % versus clean wounds, 3.57%, and this difference was statistically significant (P<0.0001).
Conclusion: In this study, 9.16% patients were diagnosed with surgery site infection. Age, diabetes, type, duration of surgery, kind of wound, hospital stay and presence of drain were all risk factors for surgery site infection.
Keywords: Diabetes, Infection, Surgical Site infections, operation

INTRODUCTION

Surgical Site Infections (SSI) are one of the most prevalent types of nosocomial infection reported in hospitalized patients. They are linked to more extended hospital stays higher hospital costs, and worse patient illness, resulting in death. It not only has a negative impact on patient outcomes but also on the financial burden. (1, 2). In their study, Kirkland et al. discovered that SSIs cause hospitalization to be extended by an average of 6.5 days, costing the hospital economy an additional $ 3089. (3) SSIs are caused by a combination of endogenous factors such as the patient's age and weight, co-morbidity, immunological status, and exogenous factors such as pre-operative hospitalization, pre-operative prophylactic measures, wound, and surgical type, equipment sterilization, etc. (4, 5)

SSIs continue to be a substantial concern in hospital practice, despite the improved understanding of the disease's etiology, conventional pre-operative and post-operative protocols, antibiotics, and sanitation techniques. The SSI rate ranges from 2 to 30% in different hospitals. (6-8).

Studies have also reported that the prevalence of infection can be reduced by following the standard operating protocols and infection icon control guidelines. A study performed in the United States of America reported that after adjusting for age, presence of devices, days from admission to survey, and status of being in a large hospital, patients' risk of getting a healthcare-associated infection was 16 % lower in 2015 than in 2011. (9)

A study performed in Pakistan reported that the prevalence of SSI in Pakistan is much higher than in developed countries. (8) Another study mentioned that Co-morbidities, advanced age, obesity, operation duration, major surgeries, and anaemia were all recognized as substantial risk factors for SSIs, and in these high-risk categories, steps should be taken to reduce SSIs. (10)

It is vital to reduce SSI rate to enhance patient outcomes and reduce the financial burden. The situation could be improved with a standard wound surveillance system and preventive protocol. The purpose of this research is to determine the incidence of SSI in our hospital hospital as well as the degree of the influence of numerous risk factors associated with SSI. This could aid in the development of hospital protocols to decrease SSI.

METHODOLOGY

The current study comprised 240 patients who underwent general surgical procedures. Permission was taken from the ethical review committee of the institute. Patients of all ages and gender, admitted to the surgery ward who had surgery (major or minor) and stayed in the hospital for more than three days were included in the study. Patients admitted to the wards after discharge due to the development of surgical site infections (SSIs) and whose treatment had not yet begun were also included. The datasheet was used to capture information such as the patient's basic demographics, underlying disease state, surgical treatment type, Type of wound class and drain presence. Wound disease was analyzed if any of the accompanying standards were met within thirty days of the medical procedure: SSIs were assessed by pus or purulent discharge from the wound along with pain. Any two cardinal signs of inflammation were diagnosed as SSI by the surgeon. The CDC (Centers for Disease Control and Prevention) standards were utilized to classify the wound type that is class I- clean, class II- clean contaminated, class III- contaminated, and class IV- dirty. All patients gave their written informed permission for the study. SPSS version 21 was used for data entry and analysis. The Chi-square was employed to link the risk factor and the outcome.

RESULTS

A total of 240 individuals were enrolled in the current study after the operation. The study population's mean age and standard deviation were 39.33 ± 2.74 years. In the current study, 27.08% (n=65) were up to 18 years old, 37.5% (n=90) were between 19 years to 50 years and 35.47% (n=85) were more than 51 years of age. Males were 62.5% (n=150) of the total population. **(As shown in Table1)** Diabetes was present in 12.5% (n=30) cases. In the current study, elective surgeries were 86.25% (n=207) and 13.75% (n=33) surgeries were performed in emergency. There were 46.66 % (n=112) clean wounds, 23.33 (n=56) with clean-contaminated wounds, 11.25% (n=27) contaminated wounds, and 18.75% (n=45) were dirty wounds. The patients, on average, spent 3.12 ± 1.01 days in the hospital before surgery. **(As shown in table Table1)**

Surgical site infections were present in 9.16% (n=22) patients. There was an increase in SSI rate in older patients, with 14.11 % (n= 12) of those over 51 years old having SSI compared to 6.66 % (n=6) among 19 to 50 years old and 6.15% (n=4) in

patients below 18 years old. This difference was statistically significant (P=0.04). (As shown in Table 2)

Diabetes was significantly associated with SSI (P<0.001). In the current study, 26.66 % ((n=8) percent of people with diabetes have SSI compared to only 6.66% (n=14) in non-diabetics. Emergency operations had a significantly greater rate of SSI than routine elective surgeries. According to wound categorization, infection rates were higher in dirty wounds (22.22 %) versus clean wounds (3.57%) and this difference was statistically significant (P=<0.0001). In this study, individuals who had a drain had a considerably higher wound infection rate (12.82 %) than those who did not had drain (7.4 %) (As shown in table 2)

Table 1: Characteristics of the study participants (n=240)

Variable	Frequency	Percentage
Gender		
Males	150	62.5
Female	90	37.5
Age (Years)		
Up to 18	65	27.08
19- 50	90	37.5
>50	85	35.41
Diabetes		
Yes	30	12.5
No	210	87.5
Type of Surgery		
Elective	207	86.25
Emergency	33	13.75
Type of Wound		
Clean	112	46.66
Clean Contaminated	56	23.33
Contaminated	27	11.25
Dirty	45	18.75
Presence of Drain		
Yes	78	32.5
No	162	67.5

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Table 2: Prevalence of surgical site infections in different parameters

Variable	SSI Present n (%)	SSI Absent n (%)	P=value
Total	22 (9.16)	218 (90.83)	
Gender			
Males	13 (8.66)	137 (91.33)	0.77
Female	9 (10)	81 (90)	
Age			
Up to 18 years	4 (6.15)	61 (93.84)	0.04
19- 50	6 (6.66)	84 (93.33)	
51 +	12 (14.11)	73 (85.88)	
Diabetes			
Yes	8 (26.66)	22 (73.33)	<0.001
No	14 (6.66)	196 (93.33)	
Type of Surgery			
Elective	15 (7.24)	192 (92.75)	<0.001
Emergency	7 (21.21)	26 (78.78)	
Type of Wound			
Clean	4 (3.57)	108 (96.42)	<0.0001
Clean Contaminated	3 (5.35)	53 (94.64)	
Contaminated	5 (18.51)	22 (81.48)	
Dirty	10 (22.22)	35 (77.77)	
Presence of Drain			
Yes	10 (12.82)	68 (87.17)	0.02
No	12 (7.40)	150 (92.59)	

DISCUSSION

The current study was a hospital-based cross sectional study undertaken to determine the incidence rate and risk variables for SSI. We observed 22 (9.16%) of the 240 individuals acquired the SSI in this study. A one-year cross-sectional study performed in Jinnah Postgraduate Medical Centre, Karachi, to evaluate the rate of SSI reported 7.3% cases of SSI. (8) In agreement with the current study's findings, SSI was noted in 7.3% of the patients in a study performed in Nepal. (11) An Indian study performed in a tertiary care hospital of Gujrat reported findings similar to our study's findings. (12) However, in contrast to the finding of our study, a study performed in Abbottabad, Pakistan, reported a very high rate of SSI. In this study, the proportion of SSIs was 33.68 %. (10)

The current investigation found a link between the age of the patient and the frequency of SSI. The frequency of SSI increases as people get older. Similar findings were documented in other studies. A recent study reported that SSIs were shown to be higher in patients over 60 years of age (44.44%) and lower in patients under 15 years of age (9.09%) (10) This could be attributed to older patients' weaker immune systems and existing co-morbidities, as well as their reduced treatment compliance. (13) In our study, we noted that the gender of the patients had no association with the severity of their SSI. This is consistent with the findings of other investigations. (13)

We observed that in diabetic individuals, SSI was highly prevalent as compared to non-diabetic patients. Other researchers have found a similar conclusion. (14, 15). Moreover, it is also reported that diabetes, in addition to its role in producing hyperglycemia before or after surgery, is a substantial factor in the risk of SSIs. The causes for this finding remain unknown. Diabetes could be a symptom of other illnesses that put a patient at increased risk of infection, such as vascular abnormalities and white blood cell malfunction. Furthermore, factors other than the patient's diabetic history, such as physiologic stresses and exogenous glucose administration, play a role in developing perioperative hyperglycemia and consequent immune suppression. (16)

We observed that longer surgical time was more linked to SSI than shorter surgery duration. Various investigations have come to the same conclusion. (17). The type of anesthesia has a strong relationship with the SSI, with general anesthesia being more common than local anesthetic. This is because procedures performed under general anesthesia are typically more complex and last longer than surgeries under local anesthesia, increasing the risk of SSI. After all, the operation site is exposed to more air and more trauma, sometimes blood loss. (18, 19)

According to this study, the rate of surgical site infection increased from a clean to a filthy incision. Other research has shown similar findings. (20, 21) We observed that emergency operations had a considerably greater rate of SSI than routine surgeries. Other studies found similar results. In emergency surgeries, patients are not fully prepared. Their co-morbidities like diabetes are not usually managed, or there are more chances of contamination of void in disinfection, previous infection, and low immunity of the patient may all contribute to a higher likelihood of SSI in emergency surgery. (22, 23) Furthermore, the majority of emergency surgeries include polluted locations such as the bowel and perianal area and dirty wounds. (24, 25)

CONCLUSION

In this study, 9.16% patients were diagnosed with surgery site infection. Age, diabetes, type, duration of surgery, kind of wound, hospital stay and presence of drain were all risk factors for surgery site infection.

Conflict of interest: None

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