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Frequency of Post-operative Surgical Site Infections among Cancer Patients

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Abstract **Original Research Article**

***Background*:** Surgical site infections (SSIs) are a significant post-operative complication, leading to prolonged hospital stays, increased healthcare costs, and higher morbidity. Identifying SSI frequency and associated risk factors is crucial for improving surgical outcomes. This study assessed the prevalence of surgical site infections and contributing factors among surgical patients in a tertiary care hospital in Bangladesh. ***Methods*:** A retrospective cross-sectional study was conducted at Department of Surgical Oncology & allied, National Institute of Cancer Research & Hospital (NICRH), Mohakhali, Dhaka, Bangladesh, from July 2023 to June 2024. A total of 83 patients who underwent surgical procedures and were followed up at the hospital were included using purposive sampling. Data were collected from medical records, including demographic characteristics, type and duration of surgery, surgical team, prophylactic antibiotic use, and post-operative outcomes. Statistical analysis was performed using SPSS version 23.0. ***Results*:** The highest proportion of patients (27.7%) were aged 46–60 years, with a male predominance (80%). Most cases (57%) were admitted through the multidisciplinary tumor board. The overall prevalence of SSIs was 12%. Among SSIs cases, 38.5% underwent elective surgery, while 29.0% had emergency procedures. The majority (59.0%) of surgeries lasted ≥90 minutes, with SSIs occurring in 36.7% of such cases. Gastrointestinal surgeries had the highest SSI incidence (45.5%), followed by orthopedic (42.9%) and hepatobiliary (27.3%) procedures. Patients with shorter hospital stays (<36 hours) had the highest SSI rate (52.0%). ***Conclusion*:** Surgical site infections (SSIs) are prevalent among patients in the tertiary care hospitals in Bangladesh, with higher rates in elective surgeries, longer procedures, and gastrointestinal surgeries. Preventive measures, improved surgical techniques, and enhanced patient care are essential to reduce SSI risk.

Keywords: Surgical site infection, Postoperative complications, Gastrointestinal surgeries, Hospital stays, Bangladesh.

INTRODUCTION

Surgical site infections (SSIs) are a significant public health concern, contributing to increased morbidity, prolonged hospital stays, and higher healthcare costs worldwide [1]. They are among the most common healthcare-associated infections (HAIs), affecting millions of patients annually. Despite advances in surgical techniques and infection control measures, SSIs remain a major challenge, particularly in resource-limited settings [2]. The World Health Organization (WHO) reports that SSIs occur in approximately 11% of surgical procedures in low- and middle-income countries, compared to 2-5% in high-income nations, indicating a substantial disparity in infection control practices and healthcare infrastructure [3]. SSIs result from microbial contamination of the surgical wound, with various factors influencing their development. Patient-related risk factors include older age, malnutrition, diabetes, obesity, and immunosuppression [4]. Procedural factors such as prolonged surgical duration, emergency procedures, inadequate antibiotic prophylaxis, and poor adherence to aseptic techniques further increase the risk [5]. Studies suggest that gastrointestinal, orthopedic, and hepatobiliary surgeries are associated with higher SSI rates due to their

complexity and susceptibility to contamination [6]. The duration of hospital stay has also been linked to an increased risk of SSIs. Prolonged hospitalization exposes patients to nosocomial pathogens, increasing the likelihood of infection [7]. Patients undergoing emergency surgeries often face a higher risk of SSIs compared to those undergoing elective procedures, as emergencies may not allow optimal preoperative preparation and infection control measures [8]. Additionally, prolonged surgical time, particularly procedures exceeding 90 minutes, has been identified as a significant risk factor for SSIs [9]. Proper implementation of preoperative, intraoperative, and postoperative infection control measures can reduce SSI incidence. WHO recommends preoperative skin antisepsis with chlorhexidine-alcohol, appropriate surgical attire, controlled ventilation in operating rooms, and the rational use of prophylactic antibiotics to minimize infection risk [10]. Despite these recommendations, adherence to guidelines varies, particularly in low-resource settings where healthcare-associated infections are more prevalent. In Bangladesh, where infection control challenges persist, there is limited data on SSI prevalence and associated risk factors in tertiary care hospitals. Understanding the burden and determinants of SSIs is crucial for developing targeted interventions to enhance surgical outcomes and improve patient safety. This study aimed to determine the prevalence of SSIs and assess key risk factors among patients undergoing surgical procedures in a tertiary care hospital in Bangladesh. Identifying these factors will help implement evidence-based strategies to minimize SSIs and improve post-operative patient care.

METHODOLOGY

This retrospective cross-sectional study was conducted among the patients admitted in various Surgery allied wards of National Institute of Cancer Research & Hospital (NICRH), Mohakhali, Dhaka, Bangladesh. From July 2023 to June 2024. A total of 83 patients who underwent surgical procedures and were followed up at the mentioned hospital were enrolled in this study using a purposive sampling technique. Properly written consents were taken form all the participants before data collection. In this study, data on post-operative surgical site infections (SSIs) were collected from medical records and patient follow-ups. Surgical procedures were categorized as elective or emergency, and their duration was noted. The types of surgeries, including gastrointestinal, orthopedic, and hepatobiliary, were recorded. The presence of SSIs was determined based on clinical signs and diagnostic criteria. Contributing factors such as surgery type, duration, and patient demographics were analyzed to assess their relationship with SSI occurrence. Data were analyzed and disseminated by the MS Office tools.

RESULT

In this study, the highest proportion of patients (27.7%) belonged to the 46–60 years age group. Males constituted the majority (80%), while females accounted for 20%. Regarding the source of admission, most patients (57%) were admitted through emergency services, followed by OPD (35%) and private clinics (8%). The overall prevalence of surgical site infection (SSI) was 12%. Among all surgical cases, 62.7% were elective surgeries, while 37.3% were emergency procedures. Among patients who developed SSIs, 38.5% had elective surgeries, and 29.0% underwent emergency surgeries. In terms of surgical duration, 59.0% of patients required ≥90 minutes for surgery, while 25.3% and 15.7% underwent procedures lasting 60-90 minutes and <60 minutes, respectively. Among SSI cases, 36.7% had surgeries lasting >90 minutes, 33.3% lasted 60-90 minutes, and 30.8% were <60 minutes. Gastrointestinal surgeries accounted for the highest proportion (27.7%), followed by orthopedic (15.7%), hepatobiliary (14.5%), gynecological (8.4%), and genitourinary (4.8%) procedures. SSIs were most frequent in gastrointestinal surgeries (45.5%), followed by orthopedic (42.9%), hepatobiliary (27.3%), genitourinary (20.0%), and gynecological (12.5%) procedures. Hospital stay duration was associated with SSIs. Among those staying <36 hours, 52.0% developed SSIs. The SSI rate was 23.5% for stays of 36-72 hours, 26.3% for 73-146 hours, and 27.3% for >146 hours. These findings highlight key factors influencing SSIs in surgical patients.

Table 1: Age distribution

Age (Years)	n	%
<15	12	14.5%
16–30	15	18.1%
31–45	18	21.7%
46–60	23	27.7%
>60	15	18.1%

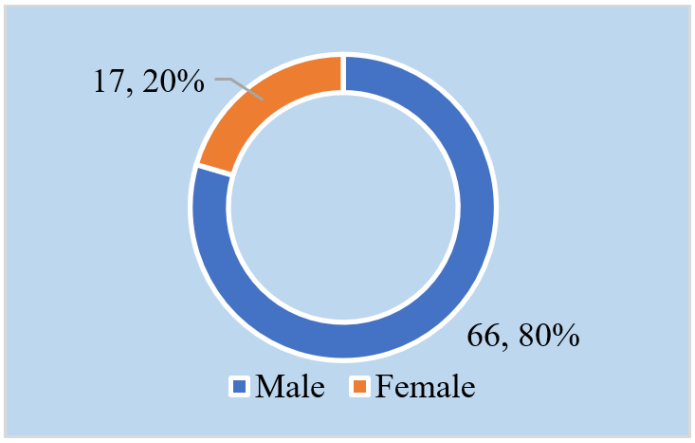
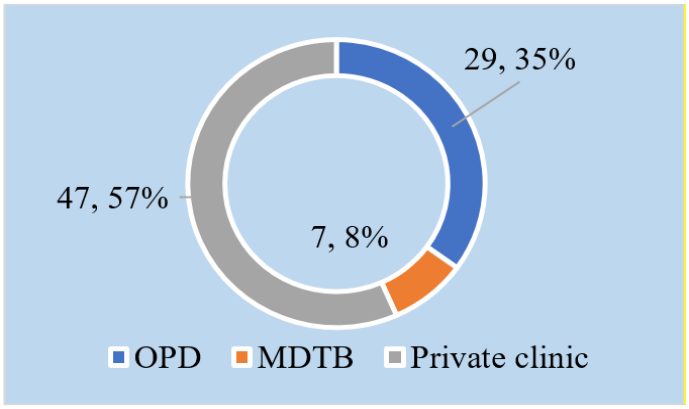


Figure 1: Gender distribution



POD: Outpatient department
Figure 2: Source of admission distribution

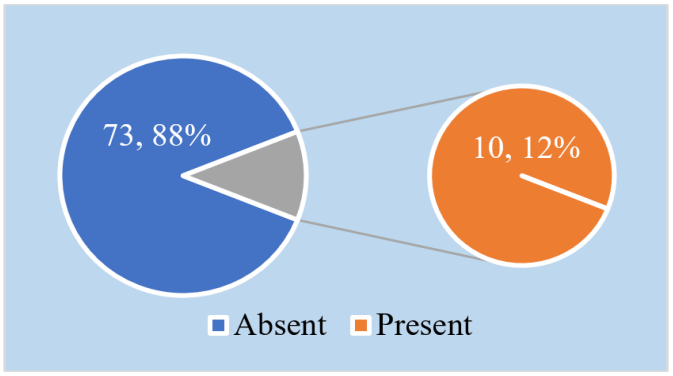


Figure 3: Prevalence of SSIs among total patients

Table 2: Prevalence of SSIs based on the plan of surgery

Plan	Total		SSIs	
	n	%	n	%
Elective	52	62.7%	20	38.5%
Emergency	31	37.3%	9	29.0%

Table 3: Prevalence of SSIs based on the duration of surgery

Minutes	Total		SSIs	
	n	%	n	%
<60	13	15.7%	4	30.8%
60-90	21	25.3%	7	33.3%
>90	49	59.0%	18	36.7%

Table 4: Prevalence of SSIs based on the fields of surgery

Problems	Total		SSIs	
	n	%	SSIs	%
Orthopedics	13	15.7%	6	42.9%
Gynecological	7	8.4%	1	12.5%
Gastrointestinal	23	27.7%	10	45.5%
Hepatobiliary	12	14.5%	3	27.3%
Genitourinary	4	4.8%	1	20.0%
Others	24	28.9%	8	34.8%

Table 5: Prevalence of SSIs based on postoperative hospital stays

Stays (Hour)	Total		SSIs	
	n	%	n	%
<36	25	30.1%	14	48.3%
36-72	17	20.5%	4	13.8%
73-146	19	22.9%	5	17.2%
>146	22	26.5%	6	20.7%

DISCUSSION

Surgical site infections (SSIs) remain a significant postoperative complication, contributing to increased morbidity, prolonged hospital stays, and higher healthcare costs [11]. In this study, the prevalence of SSIs was found to be 12%, which is consistent with previous studies conducted in similar healthcare settings [12, 13]. However, a study from developed countries have reported lower SSI rates, possibly due to improved infection control measures, advanced surgical techniques, and better adherence to perioperative antibiotic prophylaxis [14]. Age and gender distribution revealed that most patients were aged 46–60 years, with a male predominance (80% male, 20% female). Another study suggest that older age is a known risk factor for SSIs due to decreased immunity, multiple comorbidities, and delayed wound healing [15]. The predominance of male patients may reflect a higher burden of surgical conditions in men or healthcare-seeking behavior differences [16]. Regarding admission sources, 57% of cases were admitted through multidisciplinary tumor board, followed by 35% from OPD and 8% from private clinics. Emergency surgeries are associated with a higher risk of infection due to inadequate preoperative preparation and underlying systemic instability [17]. The study found that 62.7% of procedures were elective, while 37.3% were emergency surgeries. Among SSI cases, 38.5% were from elective surgeries and 29.0% from emergency procedures. Although elective procedures generally have lower SSI risks due to planned interventions, some complex surgeries, particularly in gastrointestinal and orthopedic procedures, may still predispose patients to infections [18]. The duration of surgery was another important factor. The majority of cases (59.0%) had surgical durations of ≥90 minutes, with a significant proportion of SSI cases also falling in this category (36.7% for >90 minutes, 33.3% for 60-90 minutes, and 30.8% for <60 minutes). Prolonged surgical times increase exposure to environmental contaminants and tissue handling, both of which elevate the risk of infection [19]. SSIs were most frequently observed in gastrointestinal surgeries (45.5%), followed by orthopedic (42.9%), hepatobiliary (27.3%), genitourinary (20.0%), and gynecological procedures (12.5%). Gastrointestinal procedures are inherently associated with a higher risk due to contamination from gut flora, which aligns with previous findings [20]. The study also found that prolonged hospital stay was linked to increased SSIs, with 52.0% of cases developing infections within <36 hours of admission. Patients who stayed 36-72 hours, 73-146 hours, and >146 hours had SSI rates of 23.5%, 26.3%, and 27.3%, respectively. Longer hospital stays may expose patients to nosocomial infections, emphasizing the need for strict postoperative care and timely discharge [21]. This study highlights the need for improved infection prevention strategies, including better perioperative antibiotic protocols, enhanced surgical techniques, and stricter infection control measures. Future research should focus on long-term surveillance of SSIs and evaluating the efficacy of preventive interventions in reducing infection rates.

CONCLUSION & RECOMMENDATION

The study concludes that surgical site infections (SSIs) are prevalent (12%) among patients undergoing surgery in the tertiary care hospitals in Bangladesh. The occurrence of SSIs is more frequent in elective surgeries and those that last longer than 90 minutes. Gastrointestinal surgeries are particularly associated with higher rates of SSIs, followed by orthopedic and hepatobiliary procedures. These findings emphasize the importance of preventive measures, such as improving surgical techniques, enhancing patient care before and after surgery, and addressing specific risk factors, especially for more complex and longer surgical procedures.

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