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**Original Research Article**

# Prevalence of Surgical Site Infection at JIET Medical College and Attached Hospital, Jodhpur, Rajasthan

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**Abstract:**

**Background:** Surgical Site Infections (SSIs) remain a significant burden in postoperative care, particularly in low-to-middle-income settings. They not only increase patient morbidity but also prolong hospital stay and escalate healthcare costs. This study was undertaken to determine the prevalence of SSIs in patients undergoing various surgical procedures at JIET Medical College and Attached Hospital in Jodhpur, Rajasthan.

**Objectives:** To assess the overall prevalence of SSIs, analyze the distribution of infections across different surgical categories, identify common causative organisms, and evaluate associated risk factors such as age, comorbidities, duration of surgery, and type of wound.

**Materials and Methods:** This was a hospital-based prospective observational study conducted over 12 months from January 2024 to December 2024 in the Department of General Surgery at JIET Medical College and Hospital, Jodhpur. A total of 200 patients who underwent elective or emergency surgeries were included using convenience sampling. Patients were followed up for 30 days postoperatively to monitor the development of SSIs. Data were analyzed using appropriate statistical tools.

**Results:** The overall prevalence of SSIs was found to be 17.5%. Emergency surgeries had a higher infection rate compared to elective ones. Clean-contaminated and contaminated wounds showed a significantly higher incidence. The most common organism isolated was *Staphylococcus aureus*, followed by *Escherichia coli*. Prolonged surgery duration (>2 hours), diabetes mellitus, and poor nutritional status were identified as key risk factors.

**Conclusion:** Surgical site infections remain a frequent postoperative complication in the studied population. Early identification of high-risk patients, strict adherence to sterile surgical techniques, and robust perioperative infection control protocols are essential to reducing the burden of SSIs in tertiary healthcare settings.

**Keywords:** Surgical site infection, prevalence, general surgery, wound classification, risk factors, tertiary care hospital, Staphylococcus aureus, Jodhpur



## Introduction

Surgical site infections (SSIs) are among the most prevalent healthcare-associated infections (HAIs), accounting for a substantial portion of postoperative morbidity and mortality worldwide. They are defined as infections that occur within 30 days after a surgical procedure and involve either the incision or the deeper tissues manipulated during surgery [1]. SSIs can range from superficial skin involvement to life-threatening infections affecting organs or implanted materials. Their incidence varies globally and is influenced by a multitude of factors including patient-related conditions, procedural complexity, healthcare infrastructure, and adherence to infection prevention protocols [2].

In developing countries like India, the burden of SSIs is considerably higher compared to high-income nations, with reported rates ranging from 5% to as high as 30% depending on the type of surgery and institutional practices [3]. Several factors contribute to this disparity, including inadequate infection control measures, limited surveillance systems, lack of standardized protocols, and resource constraints. SSIs not only compromise patient outcomes but also impose a significant financial burden on both the patient and the healthcare system through prolonged hospitalization, additional surgical interventions, and increased antibiotic usage [4].

Multiple intrinsic and extrinsic risk factors have been identified in the development of SSIs. Patient-specific factors include age, nutritional status, presence of comorbidities such as diabetes mellitus, immune suppression, obesity, and poor personal hygiene. Procedure-related factors include the type and duration of surgery, wound classification (clean, clean-contaminated, contaminated, dirty), use of drains, intraoperative breaches in asepsis, and the timing and choice of prophylactic antibiotics. Emergency surgeries, in particular, carry a higher risk due to the compromised preoperative preparation and increased likelihood of contaminated fields [5,6].

Microbiologically, Staphylococcus aureus continues to be the most commonly isolated pathogen in SSIs, although Gram-negative organisms like Escherichia coli, Klebsiella species, and Pseudomonas aeruginosa are also frequently identified, particularly in abdominal and contaminated surgeries. The increasing incidence of antimicrobial resistance among these pathogens further complicates treatment and highlights the need for accurate microbiological diagnosis and guided antibiotic therapy [7,8].

In light of these challenges, it becomes imperative to assess the local burden of SSIs and understand the epidemiological patterns within individual institutions. Data generated from such localized studies serve as the foundation for developing targeted infection control strategies, tailoring antibiotic stewardship programs, and improving surgical outcomes through quality assurance measures [9].

This study was therefore conducted at JIET Medical College and Attached Hospital, Jodhpur, a tertiary care teaching institution in western Rajasthan, with the primary objective of estimating the prevalence of SSIs in patients undergoing surgical procedures. Secondary objectives included examining the distribution of infections across various surgical categories, identifying predominant microbial pathogens, and evaluating the associated risk factors contributing to postoperative infections. By understanding these parameters, the study aims to aid in formulating evidence-based strategies for the prevention and control of SSIs in similar healthcare settings.

## Materials And Methods

**Study Design and Setting:** This was a hospital-based, prospective, observational study conducted in the Department of General Surgery at JIET Medical College and Attached Hospital, Jodhpur, Rajasthan. The hospital is a tertiary care center catering to a large population from both urban and rural areas of western Rajasthan. The study was carried out over a 12-month period from January 2024 to December 2024.

**Study Population:** The study included adult patients who underwent elective or emergency surgical procedures under the Department of General Surgery during the specified period. Patients were enrolled based on predefined inclusion and exclusion criteria to ensure a uniform and unbiased sample population.

**Sample Size and Sampling Technique:** A total of 200 patients were included in the study using convenience sampling. The sample size was determined based on the hospital's average monthly surgical load, available resources, and the feasibility of postoperative follow-up for infection surveillance.

**Inclusion Criteria:**

- Patients aged 18 years and above.
- Patients undergoing either elective or emergency surgical procedures.
- Patients who provided written informed consent and agreed to a 30-day postoperative follow-up.

**Exclusion Criteria:**

- Patients who expired within 48 hours of surgery.
- Patients lost to follow-up within the 30-day postoperative period.
- Patients undergoing minor surgical procedures under local anesthesia (e.g., incision and drainage).
- Patients with pre-existing infections at or near the surgical site.

**Data Collection Procedure:** Preoperative, intraoperative, and postoperative data were collected using a structured case record form. Relevant variables included patient demographics (age, gender), comorbidities (diabetes, anemia, obesity, malnutrition), type of surgery (elective or emergency), wound classification (clean, clean-contaminated, contaminated, dirty), duration of surgery, use of prophylactic antibiotics, and postoperative hospital stay.

All patients were clinically monitored for signs of surgical site infection for up to 30 days postoperatively. This included daily assessment during hospital stay and weekly outpatient visits thereafter. SSIs were diagnosed based on the criteria defined by the Centers for Disease Control and Prevention (CDC), including signs of local inflammation (pain, erythema, swelling, purulent discharge) or systemic features such as fever with positive wound cultures.

**Microbiological Evaluation:** In cases where an SSI was suspected, wound swabs or pus samples were collected under aseptic precautions and sent for culture and sensitivity testing in the microbiology department. Identification of bacterial species and their antibiotic susceptibility profiles were carried out using standard laboratory techniques.

**Outcome Measures:** The primary outcome was the prevalence of SSIs among the study population. Secondary outcomes included analysis of common pathogens involved, comparison of SSI rates among different wound types and surgery categories, and identification of associated risk factors contributing to the development of SSIs.

**Statistical Analysis:** All data were entered into Microsoft Excel and analyzed using SPSS software (version 25). Descriptive statistics were used for demographic data, with categorical variables expressed as frequencies and percentages, and continuous variables as mean ± standard deviation. Associations between risk factors and incidence of SSIs were assessed using the chi-square test and unpaired t-test where applicable. A p-value of less than 0.05 was considered statistically significant.

**Results**

The present study was conducted on a total of 200 patients who underwent surgical procedures during the study period. The aim was to evaluate the prevalence of surgical site infections (SSIs), assess associated demographic and clinical variables, identify common pathogens involved, and determine contributory risk factors. Out of the 200 patients, 35 developed SSIs, reflecting an overall prevalence of 17.5%. Emergency surgeries, contaminated and dirty wounds, prolonged operative times, and underlying comorbidities such as diabetes mellitus were found to be significantly associated with higher infection rates. The majority of infections were observed within the first 10 postoperative days. Staphylococcus aureus was the most commonly isolated organism.

**Table 1: Age-Wise Distribution of Patients (n = 200)**

| Age Group (Years) | Number of Patients | Percentage (%) |
|---|---|---|
| 18–30 | 42 | 21.0 |
| 31–50 | 83 | 41.5 |
| 51–70 | 59 | 29.5 |
| >70 | 16 | 8.0 |

**Table 2: Gender Distribution (n = 200)**

| Gender | Number of Patients | Percentage (%) |
|---|---|---|
| Male | 124 | 62.0 |
| Female | 76 | 38.0 |

**Table 3: Type of Surgical Procedure (n = 200)**

| Type of Surgery | Number of Patients | Percentage (%) |
|---|---|---|
| Elective | 123 | 61.5 |
| Emergency | 77 | 38.5 |

**Table 4: Prevalence of Surgical Site Infections (n = 200)**

| Infection Status | Number of Patients | Percentage (%) |
|---|---|---|
| No SSI | 165 | 82.5 |
| SSI Present | 35 | 17.5 |

**Table 5: SSI Occurrence by Type of Surgery (n = 200)**

| Type of Surgery | SSI Cases | Percentage (%) |
|---|---|---|
| Elective | 14 | 11.4 |
| Emergency | 21 | 27.3 |

**Table 6: Wound Classification and SSI Rate (n = 200)**

| Wound Type | Total Patients | SSI Cases | SSI Rate (%) |
|---|---|---|---|
| Clean | 82 | 6 | 7.3 |
| Clean-Contaminated | 57 | 10 | 17.5 |
| Contaminated | 34 | 11 | 32.4 |
| Dirty | 27 | 8 | 29.6 |

**Table 7: Comorbid Conditions and SSI Incidence (n = 200)**

| Comorbidity | Total Patients | SSI Cases | Percentage with SSI (%) |
|---|---|---|---|
| Diabetes Mellitus | 48 | 15 | 31.3 |
| Anemia | 36 | 8 | 22.2 |

| | | | |
|---|---|---|---|
| No Comorbidity | 116 | 12 | 10.3 |

**Table 8: Duration of Surgery and SSI Incidence (n = 200)**

| Duration of Surgery | Number of Patients | SSI Cases | SSI Rate (%) |
|---|---|---|---|
| ≤ 2 hours | 123 | 10 | 8.1 |
| > 2 hours | 77 | 25 | 32.5 |

**Table 9: Microorganisms Isolated from SSI Cases (n = 35)**

| Organism | Number of Isolates | Percentage (%) |
|---|---|---|
| Staphylococcus aureus | 14 | 40.0 |
| Escherichia coli | 9 | 25.7 |
| Klebsiella spp. | 5 | 14.3 |
| Pseudomonas aeruginosa | 4 | 11.4 |
| Polymicrobial | 3 | 8.6 |

**Table 10: Time to Onset of SSI After Surgery (n = 35)**

| Postoperative Day Range | Number of SSI Cases | Percentage (%) |
|---|---|---|
| 1–5 days | 11 | 31.4 |
| 6–10 days | 14 | 40.0 |
| 11–15 days | 6 | 17.1 |
| 16–30 days | 4 | 11.4 |

**Table Summary:** Table 1 and Table 2 provided demographic insights, showing a predominance of patients in the 31–50 age group and a male majority. Table 3 revealed that most surgeries were elective in nature. Table 4 established the overall prevalence of SSIs at 17.5%. Table 5 demonstrated a significantly higher infection rate in emergency surgeries compared to elective ones. Table 6 showed a correlation between wound type and infection, with dirty and contaminated wounds exhibiting the highest SSI rates. Table 7 identified diabetes mellitus as the most significant comorbidity associated with infections. Table 8 confirmed that surgeries lasting more than 2 hours carried a higher risk of SSI. Table 9 presented Staphylococcus aureus as the leading pathogen, while Table 10 showed that most infections manifested within 10 days postoperatively. Together, these tables comprehensively highlight the key epidemiological, clinical, and microbiological characteristics associated with surgical site infections in this study population.

## Discussion

This hospital-based prospective observational study was undertaken to assess the prevalence of surgical site infections (SSIs) and evaluate the contributing factors among patients who underwent surgical procedures at JIET Medical College and Attached Hospital, Jodhpur. The findings offer significant insight into the patterns of infection, their relation to patient-specific and procedural variables, and the microbiological agents responsible for such infections [10].

The overall prevalence of SSI in this study was 17.5%, which is within the range reported in tertiary care centers across various parts of India. This rate reflects the ongoing challenge that SSIs continue to pose despite the implementation of standard aseptic techniques and antibiotic prophylaxis protocols. The burden of SSI contributes not only to patient morbidity and prolonged hospital stays but also to increased healthcare costs and resource utilization [11,12].

A closer look at the demographic distribution reveals that SSIs were more common in patients within the age group of 31–50 years, which also represented the majority of the surgical population. Although age alone was not found to be a significant risk factor in isolation, advancing age often correlates with the presence of comorbidities, which were shown to influence SSI rates in this study [13]. Gender distribution indicated a higher proportion of male patients, and SSIs were also more frequently observed in this group. However, the gender-based difference in infection rates was not statistically significant, suggesting that gender may not be an independent predictor of infection risk [14]. One of the most noteworthy observations in this study was the significantly higher prevalence of SSIs among patients who underwent emergency surgeries. Emergency procedures, often performed under suboptimal conditions with limited preoperative preparation time, are inherently associated with a higher risk of contamination. Additionally, the need for urgent intervention may compromise adherence to strict sterile protocols [15].

The type of surgical wound emerged as a strong predictor of SSI development. Clean wounds had the lowest infection rates, while contaminated and dirty wounds exhibited a considerably higher incidence of SSIs. This relationship highlights the importance of preoperative wound categorization as a predictive tool for postoperative surveillance and antibiotic coverage planning [16].

Comorbid conditions, particularly diabetes mellitus, were found to significantly influence the incidence of SSIs. Patients with diabetes had a notably higher risk, likely due to impaired immune response, delayed wound healing, and microvascular complications. Anemia and malnutrition were also associated with increased SSI rates, albeit to a lesser degree [17].

Operative duration also played a crucial role in infection development. Surgeries lasting more than two hours demonstrated a significantly higher rate of SSI compared to those completed in less time. Prolonged operative times may lead to extended tissue exposure, increased handling, and fatigue-related lapses in aseptic technique, all contributing to infection risk [18].

The microbiological profile of isolated pathogens underscores the dominance of Staphylococcus aureus, followed by Escherichia coli, Klebsiella spp., and Pseudomonas aeruginosa. This pathogen distribution is consistent with the expected flora in surgical infections, suggesting both endogenous contamination and hospital-acquired transmission. Notably, a small proportion of polymicrobial infections were also observed, particularly in cases involving contaminated or dirty wounds [19].

Timing of infection onset was most commonly within the first 10 postoperative days, indicating that the early postoperative period is critical for wound surveillance and preventive interventions. Close monitoring and patient education regarding wound care during this window can significantly reduce delayed presentation and complications [20].

The findings of this study reaffirm the multifactorial nature of SSIs. While certain variables like patient demographics are non-modifiable, many procedural and perioperative factors such as surgery type, wound classification, duration, and antibiotic use can be optimized to reduce infection risk. Emphasis must be placed on the implementation of evidence-based SSI prevention bundles, perioperative glycemic control, timely antibiotic prophylaxis, and meticulous surgical technique.

Overall, the study highlights the pressing need for continuous monitoring of SSI rates through robust hospital surveillance programs. Incorporation of targeted interventions for high-risk patients and procedures can significantly improve surgical outcomes, reduce infection burden, and enhance the overall quality of patient care.

## Conclusion

This prospective observational study conducted at JIET Medical College and Hospital, Jodhpur, underscores the substantial prevalence of surgical site infections, with an overall rate of 17.5% among operated patients. The findings clearly demonstrate that SSIs are influenced by multiple interrelated factors including the urgency of surgery, wound classification, presence of comorbidities (notably diabetes mellitus), and the duration of the operative procedure. Emergency surgeries and contaminated or dirty wounds exhibited significantly higher infection rates, affirming their role as major contributors. The study also identified Staphylococcus aureus as the predominant pathogen responsible for SSIs.

The early postoperative period, particularly the first 10 days, was observed to be the most critical window for infection onset, emphasizing the importance of vigilant postoperative monitoring and timely wound care. These results highlight the need for sustained infection control measures, careful preoperative patient assessment, and strict adherence to aseptic protocols. Implementation of standardized SSI surveillance, timely prophylactic antibiotic use, and effective glycemic control in diabetic patients can substantially mitigate infection risks.

In conclusion, surgical site infections remain a major yet preventable complication in postoperative care. Proactive interventions and evidence-based clinical practices tailored to local epidemiological patterns are essential to reduce SSI rates, enhance recovery, and improve surgical outcomes.

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