Section: General Surgery

Original Research Article

A CLINICAL AUDIT ON THE USE AND OUTCOME OF PROPHYLACTIC ANTIBIOTICS IN GENERAL SURGICAL PROCEDURES AT A TERTIARY CARE CENTER

Received : 04/03/2025
Received in revised form : 22/04/2025
Accepted : 08/05/2025

Keywords:
Prophylactic antibiotics, surgical site infection, general surgery, clinical audit, antibiotic adherence.

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DOI: 10.47009/jamp.2025.7.3.25

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2025; 7 (3); 131-135

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ABSTRACT

Background: Surgical site infections (SSIs) significantly impact postoperative outcomes, increasing morbidity, length of stay, and healthcare costs. The judicious use of prophylactic antibiotics plays a critical role in preventing SSIs. This clinical audit evaluates the pattern of prophylactic antibiotic use and associated outcomes in general surgical procedures. **Objectives:** To assess the adherence to standard guidelines in the timing, selection, and duration of prophylactic antibiotics and correlate these with SSI rates in patients undergoing general surgical procedures. **Materials and Methods:** A retrospective audit was conducted on 100 patients who underwent general surgical procedures at a tertiary care center. Data on demographic details, antibiotic administration (timing, choice, and duration), and postoperative outcomes were collected and analyzed. SSI occurrence was compared between patients with and without adherence to standard antibiotic prophylaxis guidelines. **Result:** Of the 100 patients, 58 were male and 42 female, with a mean age of 47.6 ± 13.2 years. Antibiotic prophylaxis was administered within 60 minutes prior to incision in 92% of cases. Ceftriaxone was the most commonly used antibiotic (60%). Although 78% received antibiotics for less than 24 hours postoperatively, 22% exceeded the recommended duration. The overall SSI rate was 6%. Patients with complete adherence to guidelines had a significantly lower SSI rate (3.3%) compared to those with deviations (30%). **Conclusion:** Adherence to prophylactic antibiotic guidelines is strongly associated with reduced SSI rates. Continuous monitoring and guideline-based protocols are essential to ensure patient safety and optimize surgical outcomes.

INTRODUCTION

Surgical site infections (SSIs) remain one of the most prevalent healthcare-associated infections globally, accounting for a significant proportion of postoperative complications. They contribute substantially to increased patient morbidity, prolonged hospital stays, and heightened healthcare costs, especially in resource-limited settings where infection control measures may not be uniformly implemented.[1,2] Despite advancements in aseptic techniques, surgical practices, and perioperative care, SSIs continue to pose a challenge to patient safety, particularly in low- and middle-income countries.[3]

Appropriate use of prophylactic antibiotics has been well-established as an effective strategy to prevent SSIs. International guidelines, including those by the World Health Organization and national surgical associations, recommend the administration of prophylactic antibiotics within 60 minutes prior to incision, selection of a narrow-spectrum antibiotic suitable for the procedure, and discontinuation within 24 hours postoperatively in most surgical cases.[4,5] These measures aim to achieve optimal tissue concentration of the antibiotic at the time of potential bacterial exposure and minimize unnecessary antimicrobial exposure.

However, studies across various healthcare settings have reported frequent deviations from these recommended practices. Inappropriate timing of administration, extended duration beyond 24 hours, and the use of broad-spectrum or non-recommended antibiotics are commonly observed issues.[6] Such deviations compromise the clinical effectiveness of prophylaxis and contribute to the growing burden of

ISSN (O): 2687-5365; ISSN (P): 2753-6556

antimicrobial resistance, adverse drug reactions, and unnecessary healthcare expenditures.[7]

This clinical audit was conducted at a tertiary care center to evaluate the real-world practice of prophylactic antibiotic use in general surgical procedures. The audit aimed to assess the degree of adherence to standard prophylactic antibiotic guidelines and examine the association between compliance and the incidence of SSIs. Identifying gaps in practice will help inform targeted interventions, promote antimicrobial stewardship, and ultimately enhance surgical safety and patient outcomes.

MATERIALS AND METHODS

Study Design

A retrospective clinical audit was conducted to evaluate the use and outcomes of prophylactic antibiotics in general surgical procedures.

Study Period and Setting

The audit was carried out over a period of eight months, from August 2024 to March 2025, at the Department of General Surgery, Government Medical College (GMC), Rajanna Sircilla, Telangana.

Study Population

The study included 100 patients who underwent general surgical procedures during the audit period. Patients of all genders aged 18 years and above were included. Patients undergoing minor surgeries under local anesthesia and those with incomplete medical records were excluded.

Data Collection

Data were collected retrospectively from operation theater registers, inpatient case records, and postoperative follow-up notes. A structured data collection form was used to record the following variables:

Patient demographics (age, gender)

Type and urgency of surgical procedure (elective/emergency)

Timing of prophylactic antibiotic administration (within or beyond 60 minutes before incision)

Type of antibiotic administered

Duration of postoperative antibiotic use

Occurrence of surgical site infections (documented during hospital stay or follow-up)

Standards for Comparison

Antibiotic practices were evaluated against widely accepted surgical prophylaxis guidelines, including:

Administration within 60 minutes before surgical incision

Use of recommended first-line antibiotics

Discontinuation within 24 hours postoperatively

Data Analysis

Descriptive statistics were used to summarize patient characteristics and antibiotic use patterns. SSI rates were compared between patients who adhered to guidelines and those who did not. Results were presented using frequency tables and percentages. A chi-square test was applied to assess the association between guideline adherence and SSI rates, with a p-value of <0.05 considered statistically significant.

Ethical Considerations

The study was approved by the Institutional Ethics Committee of Government Medical College, Rajanna Sircilla, Telangana, prior to initiation. Written informed consent was obtained from all participants before their inclusion in the audit. Confidentiality and anonymity of patient data were strictly maintained throughout the audit process.

RESULTS

A total of 100 patients undergoing general surgical procedures were included in the audit. Of these, 58% were male and 42% were female, with a mean age of 47.6 ± 13.2 years. [Table 1]

Regarding preoperative antibiotic administration, 92% of patients received antibiotics within 60 minutes prior to surgical incision, in accordance with standard prophylactic guidelines. However, 8% received antibiotics beyond the recommended timeframe or not at all (Table 2). The most commonly administered antibiotic was Ceftriaxone (60%), followed by Cefazolin (25%) and Amoxicillin-Clavulanic Acid (15%). [Table 3]

Concerning the duration of prophylactic antibiotic use, 78% of patients received antibiotics for less than 24 hours postoperatively, aligning with best practices. However, 22% of patients were given antibiotics beyond 24 hours, reflecting deviation from recommended protocols. [Table 4]

The overall surgical site infection (SSI) rate observed was 6% (n = 6) (Table 5). Among patients who received antibiotics in full compliance with standard guidelines (correct timing, choice, and duration), the SSI rate was 3.3% (3 out of 90). In contrast, patients with any deviation from guidelines experienced a significantly higher infection rate of 30% (3 out of 10), indicating a statistically relevant association between non-compliance and adverse outcomes. [Table 6]

When stratified by type of surgery, gastrointestinal procedures accounted for the highest incidence of surgical site infections (SSIs), with a rate of 8% (4 out of 50 cases). In comparison, hernia repair surgeries showed a lower SSI rate of 2.2% (1 out of 45 cases), while no SSIs were reported among patients who underwent cholecystectomy (0 out of 5 cases) (Table 7). Additionally, the infection rate was higher in emergency surgeries (10%) compared to elective procedures (4%), suggesting the role of urgency in postoperative infection risk. [Table 8]

Table 1: Demographic Profile of Patients (N = 100)

Variable	Frequency (n)	Percentage (%)
Gender		

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Male	58	58%
Female	42	42%
Mean Age (years)	47.6 ± 13.2	–

Table 2: Preoperative Antibiotic Administration

Timing of Administration	Frequency (n)	Percentage (%)
Within 60 minutes before incision	92	92%
After 60 minutes or not administered	8	8%

Table 3: Choice of Prophylactic Antibiotic

Antibiotic Type	Frequency (n)	Percentage (%)
Ceftriaxone	60	60%
Cefazolin	25	25%
Amoxicillin-Clavulanic Acid	15	15%

Table 4: Duration of Postoperative Antibiotic Prophylaxis

Duration	Frequency (n)	Percentage (%)
< 24 hours	78	78%
> 24 hours (inappropriate)	22	22%

Table 5: Surgical Site Infection (SSI) Rate

SSI Occurrence	Frequency (n)	Percentage (%)
Yes	6	6%
No	94	94%

Table 6: SSI vs Guideline Adherence

Antibiotic Compliance	SSI (n)	Total (n)	SSI Rate (%)
Adherent to all guidelines	3	90	3.3%
Deviations from guidelines	3	10	30%

Table 7: SSI by Type of Surgery

Type of Surgery	SSI (n)	Total Cases (n)	SSI Rate (%)
Gastrointestinal	4	50	8%
Hernia Repair	1	45	2.20%
Cholecystectomy	0	5	0%

Table 8: SSI by Surgical Urgency

Type of Surgery	SSI Rate (%)
Emergency Surgery	10%
Elective Surgery	4%

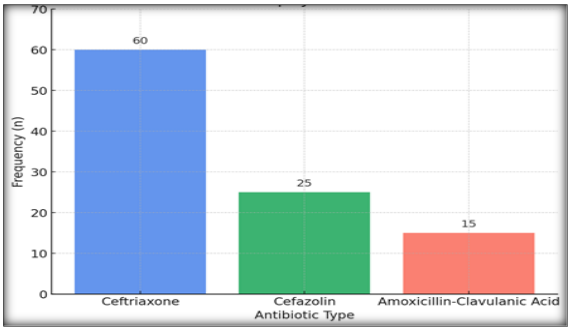

Figure 1: Choice of Prophylactic Antibiotic

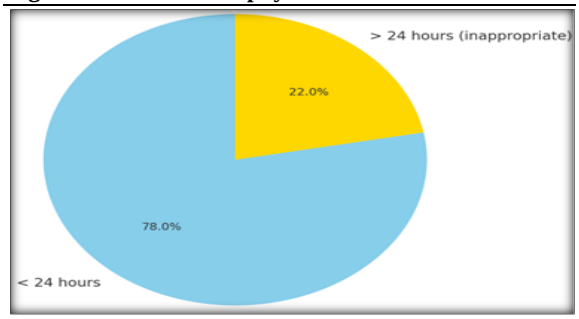

Figure 2: Duration of Postoperative Antibiotic Prophylaxis

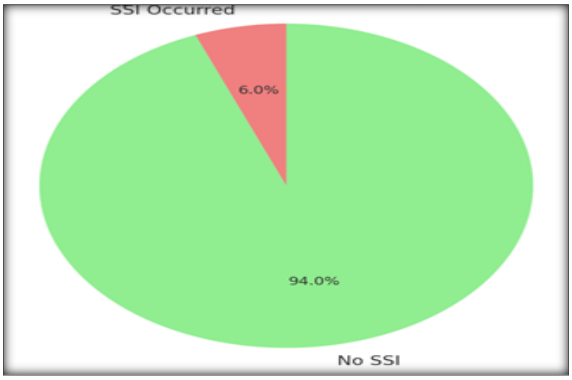

Figure 3: Surgical Site Infection (SSI) Rate

DISCUSSION

This clinical audit evaluated the adherence to prophylactic antibiotic guidelines and their association with surgical site infection (SSI) outcomes in general surgical procedures at a tertiary care center. The findings revealed that while most patients received antibiotics as per standard

ISSN (O): 2687-5365; ISSN (P): 2753-6556

protocols, notable deviations in timing, choice, and duration were still evident.

Preoperative antibiotic administration within the recommended window of 60 minutes prior to incision was achieved in 92% of cases, indicating relatively high compliance. Similar adherence rates have been observed in studies conducted in Pakistan and France, where targeted audits and institutional protocols have led to improved practice patterns.[8,11] However, 8% of patients in this audit received antibiotics too early or too late, potentially diminishing their preventive efficacy.

Ceftriaxone was the most commonly administered antibiotic (60%), despite guidelines generally recommending narrower-spectrum agents like cefazolin for routine prophylaxis. This trend is consistent with findings from other Indian and Middle Eastern studies, where broad-spectrum antibiotics are often used irrespective of procedure-specific recommendations.[10,13] The variation in antibiotic choice may stem from local prescribing habits, availability, or lack of regular policy updates, suggesting a need for institutional antibiotic stewardship interventions.[14]

Additionally, 22% of patients received antibiotics for longer than 24 hours postoperatively, which deviates from international guidelines that recommend limiting prophylaxis duration to reduce the risk of antimicrobial resistance and adverse effects. Similar concerns were raised in earlier audits, which reported prolonged prophylaxis as a persistent gap in compliance.[9,12]

The overall SSI rate in this study was 6%, aligning with global benchmarks. However, among patients adhering strictly to all three components of prophylaxis—correct timing, appropriate selection, and limited duration—the SSI rate was significantly lower (3.3%) compared to those with deviations (30%). This substantial difference echoes previous findings that underscore the protective role of guideline-adherent prophylaxis in surgical patients.[8,10]

Higher SSI rates in gastrointestinal surgeries and emergency procedures in this audit are also consistent with trends reported in other audits, where factors such as contamination risk, urgency, and patient comorbidities contribute to increased infection risk.[9,13] These observations support the need for tailored prophylactic strategies based on surgical type, urgency, and individual patient risk profiles.[11,14]

Overall, this audit reinforces the necessity of continuous education, monitoring, and feedback to improve antibiotic prophylaxis practices. Targeted interventions, routine audits, and adherence to evidence-based guidelines can significantly enhance patient safety and surgical outcomes across healthcare settings

CONCLUSION

This clinical audit highlights the importance of adherence to prophylactic antibiotic guidelines in preventing surgical site infections (SSIs) in general surgical procedures. While most patients received antibiotics within the recommended time frame, deviations in antibiotic selection and prolonged postoperative use were observed. The significantly higher SSI rate among patients with non-adherence underscores the impact of guideline violations on patient outcomes. The audit emphasizes the need for regular training, protocol reinforcement, and institutional antibiotic policy updates to ensure compliance. Strengthening antibiotic stewardship and promoting evidence-based practices can lead to safer surgeries, reduced infection rates, and improved patient care in tertiary healthcare settings.

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