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A Study of Prescription Pattern of Antibiotic Changes During Post Operative Hospital Stay

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A B S T R A C T

Surgical site infections (SSIs) remain common postoperative complications despite infection control advancements. Antibiotic prophylaxis is routinely used to reduce infection-related morbidity and mortality. However, rising antibiotic resistance, often due to inappropriate use, is a growing concern. Postoperative antibiotic upgradation is commonly practiced to combat resistance, though often without clear justification. Rational and timely antibiotic use can reduce mortality, morbidity, and healthcare costs. Yet, limited data exists on antimicrobial use and misuse in surgical inpatients. This study aims to evaluate antibiotic utilization and upgradation patterns in postoperative patients in the Department of Surgery, highlighting the need for evidence-based antimicrobial practices.

Aims and Objectives: Antibiotic prophylaxis is essential to prevent post-surgical wound infections. Rational use with appropriate upgradation can significantly reduce mortality, morbidity, and lead to substantial savings in healthcare resources.

Method: A 3-month prospective study at Gauhati Medical College included 202 post-operative patients of all ages in the post-operative care unit. Willing participants were assessed to analyze antibiotic changes after surgery, aiming to evaluate patterns and reasons for modifications in post-operative antibiotic therapy.

Result: Among 202 patients, 226 antibiotics were used. Ceftriaxone 1g was most frequently changed post-operatively, while piperacillin+tazobactam 4.5g was most commonly used. Surgical site infection (SSI) was the major reason for antibiotic change.

Conclusion: Postoperative antibiotic changes help reduce SSIs, drug reactions, and complications. This study underscores the need for monitoring prescription patterns, rational use, and timely upgrades. It advocates regular audits, antimicrobial stewardship, and adherence to guidelines to combat resistance and improve patient outcomes.

Keywords: *Surgical Site Infections (SSI), Antibiotic Utilization, Postoperative Antibiotic Change*.

INTRODUCTION

Surgical Site Infections (SSI) are a common complication associated with surgery, with reported incidence rates of 2-20%. It is also the second most common cause of nosocomial infections. (1) Surgical site infections (SSIs) continue to constitute a major challenge to healthcare institutions as a leading cause of healthcare associated infections (HAIs). (2) While the global estimates of surgical site infection (SSI) have varied from 0.5% to 15%, studies in India have consistently shown higher rates ranging from 23% to 38%. (3) The rapid emergence of resistant bacteria is occurring worldwide, endangering the efficacy of antibiotics, hence there is need of changing postoperative antibiotic prophylaxis. SSI contributing

significantly to health care associated patient morbidity, death, and costs. With increasing multidrug resistance and limited availability of newer agents and variability in coast, there is urgent need for surveillance and infection control, practice of change in antibiotic prophylaxis is done.

In India, there are National Treatment guidelines for Antimicrobial use in infectious diseases given by National Centre for disease Control (NCDC), Directorate General of Health Services, Ministry of Health & Family Welfare, Government of India (2016) and Treatment Guidelines for Antimicrobial Use in Common Syndromes given by Indian Council of Medical Research (ICMR), Department of Health Research, New Delhi, 2017. (4) SSIs can lead to substantial patient morbidity, prolong hospital stays, and, in severe cases, result in mortality. (5) It is responsible for increasing length of stay of patient which results in social and economic loss to the patients and family. Host factors, wound factors and surgery related factors are implicated in the causation of SSI. (6) Patients who develop SSI experience pain, disability, poor healing with risk of wound breakdown and hernia, prolonged recovery times, and psychological challenges, leading to high resource use. (7)

MATERIAL AND METHODS:

It is a prospective study, data were collected from 202 post-operative patients who were admitted during a study period of 3 months who fulfilled the inclusion and exclusion criteria.

For the study, following data were collected - (i) age, (ii) gender, (iii) diagnosis of the patient, and (iv)operative procedure (V)ongoing treatment. Detailed information on drugs dose and frequency and duration of treatment was recorded from the patient medical records.

Inclusion criteria

(1) Patients of either gender who had completed 18 years to 65 years on December 31st, 2022.
(2) Patients who are willing to give informed consent.

Exclusion criteria

(1) Patients who were unwilling to participate in the study.
(2) Seriously ill patients.
(3) Patients requiring intensive care unit admission or on ventilators.
(4) Patients who were mentally unstable.

The data from the medical records of the patient was noted in profile form and entered in excel sheet. The data was analysed by using Microsoft excel Worksheet and descriptive statistics such as mean, frequency and percentage were calculated. The WHO prescribing indicators are followed to analyse the drugs. The Institutional Ethics Committee permission was taken to conduct this study with MC. No (190/2007/Pt-II/April-2023/7) dated 23/06/2023.

RESULTS

In our study, 202 number of patients were followed on surgery department, enrolled during the study period of 3 months. They received 226 numbers of antibiotics.

Out of 202 patients 110(54%) were male and 92(46%) were female.

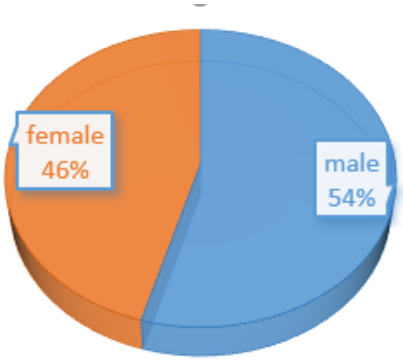

Fig 1: Gender distribution

Out of 202 maximum of the patients belong to the age group of 45 to 54 years (27.20%) (Table1).

Table 1: Age Distribution

Age group	Number of patients	percentage
18 to 24 years	14	6.93%
25 to 34 years	34	16.83%
35 to 44 years	49	24.25%
45 to 54 years	55	27.20%
55 to 60 years	31	15.34%
60 years above	19	9.40%

Out of 202 operation done, majority of the surgeries were related to gall bladder pathology63(31.19%) which include open cholecystectomy 30(14.85%), laparoscopic cholecystectomy 18(8.91%), exploratory cholecystectomy 7(3.46%), cholecystectomy with CBD exploration 8(3.96%) followed by appendicectomy 42(20.79%)and exploratory laparotomy 19(9.40%), wound closure 18(8.91%), abscess drainage 13(6.43%), different hernia repair 23(19.02%) including hernioplasty 13(6.43%), herniotomy 6(2.97%) and herniorrhaphy 4(1.98%) with other common surgeries of circumcision, cystectomy, excision , gastro-jejunostomy , perforation closure and SDH evacuation.

In this study, different groups of antibiotics are being used during the time of admission. Ceftriaxone 1gm is the most commonly used as pre-operative prophylactic care to the patients, they were used in 79(27.7%) patients in total. Followed by piperacillin+tazobactum4.5gm in 56(19.6%) patients, Ceftriaxone+salbactum1.5gm in 44(15.4%) patients, Meropenem1gm 35(12.3%) patients, Metronidazole400mg in 29(10.2%) patients. (Table 2)
Many of the antibiotics were changes in our study post operatively. Pipperacillin+tazobactum4.5gm was the most commonly used post-operative prophylactic antibiotic, which was 69(24.7%)

Table 2: Pre and Post Operative Antibiotic Intervention.

ANTIBIOTICS	PREOPERATIVE INTERVENTION		POST-OPERATIVE INTERVENTION	
CEFTRIAXONE 1 GM	79	(27.7%)	64	(21.9%)
PIPERACILLIN+TAZOBACTUM 4.5 GM	56	(19.6%)	69	(23.6%)
CEFTRIAXONE+SALBACTUM 1.5GM	44	(15.4%)	51	(16.0%)
MEROPENEM 1 GM	35	(12.3%)	40	(13.6%)
METRONIDAZOLE 400 MG	29	(10.2%)	28	(9.6%)
CEFEPIME 1GM	11	(3.9%)	10	(3.4%)
LEVOFLOXACIN 500 MG	10	(3.5%)	10	(3.7%)
AMIKACIN 500 MG	9	(3.2%)	6	(2.1%)
LNZ 600 MG	9	(3.2%)	7	(2.4%)
TEGICYCLINE 400 MG	2	(0.7%)	4	(2.7%)
AMOXYCLAV 625 MG	1	(0.4%)	1	(0.3%)
	285		290	

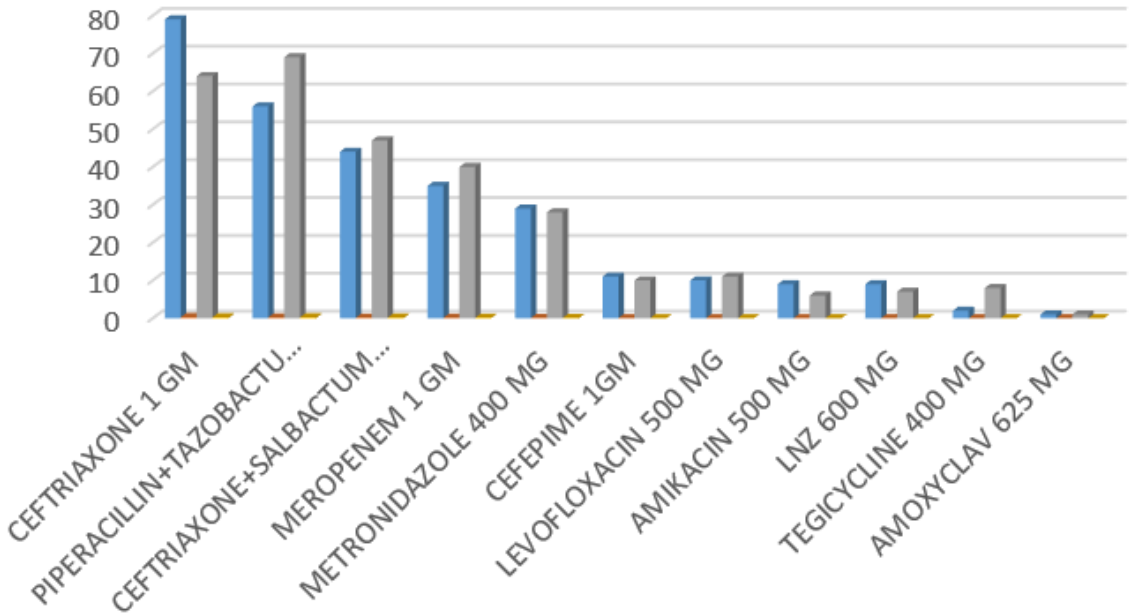

Fig 2: Pre and Post Operrative Antibiotic Intervention of Different Antibiotics

In our study, need of change of antimicrobials were needed in 46 patients, in 2 patients duel change of antibiotics was done, table 3 showing the numbers of antibiotics changed

Table 3: Number of Different Antibiotics Changed Post Operatively

ANTIBIOTICS	CHANGED NUMBERS
CEFTRIAXONE 1GM	15
PIPERACILLIN+TEZOBACTUM	13
CEFTRIAXONE+CEFTRIAXONE 1.5 GM	7
MEROPENEM	5
AMIKACIN	3
LNZ	2
TEGICYCLINE	2
METRONIDAZOLE	1
CEFIPIME	1
LEVOFLOXACIN	0
AMOXYCLAV	0

In our study, ceftriaxone1gm was the drug found to be changed maximally, Table 4 showing the changing antibiotic pattern for Ceftriaxone 1 gm.

Table 4: Changing Antibiotic Pattern for Ceftriaxone 1 Gm.

Primary antibiotic	Changed Antibiotics	Total Numbers
Ceftriaxone 1gm	Ceftriaxone+Salbactum 1.5 gm	6
Ceftriaxone 1gm	Piperacillin+ Tazobactum 4.5gm	6
Ceftriaxone 1gm	Mereopenem1gm	3

We have found that, the change of antibiotics were due to many factors, that includes antibiotic resistance, patients clinical condition, allergic reaction and toxicity.in our study 49 number patients were changed with antibiotics, which is 24.2% of

the total patients. Maximum change of antibiotics were changed due to antibiotic resistance 69% (31 out of 49). Other causes are, allergic reaction 20%, patient clinical condition 10%, Toxicity 4% and other unknown cause 2%.

DISCUSSION

Monitoring of systems and interventions are useful in improving quality of healthcare system, Recent studies reported that the SSI rate ranges from 19.4% to 36.5% all over the world, whereas it ranges from 3% to 12% in India (8). SSI is recorded to be the most common complication post operatively , in our study it is 24.2% which(49 out of 202) which is much lower than that of Farhan Sattar et all result of 33.68% (32 out of 95)(9) and is higher to the results of Ansul Kumar et all publication of "Prevalence of surgical site infection in general surgery in a tertiary care centre in India" which is 12.5%(10) According to the study of H Hassanzadeh et all study of controlling SSI postoperatively, most commonly used antibiotic was Cefuroxime, where as in our study it is Ceftriaxone 1gm 79(27.7%) in number.(11) In our study antibiotics resistance was the major cause of SSI (31 of 202) which is 15.3%, according to Bahoravitch et all study it was 9.15%.(12) In our study, most commonly changed antibiotic was also Ceftriaxone1gm, which was changed in 15 numbers of occasion either due to SSI, antibiotic resistance or due other above mentioned cases. Antibiotic resistance was the major cause of change of antibiotics in post-operative cases. It accounts for 31 of 49(69%) cases.

CONCLUSION

Post-operative change in antibiotics are necessary to reduce SSI, drug allergy and drug interaction which ultimately leads to prevention in mortality and morbidity in postoperative patients. This study highlights the importance of monitoring antibiotic prescription patterns and their changes during the postoperative hospital stay to mitigate surgical site infections (SSIs), antibiotic resistance, and associated complications. The findings shows that rational antibiotic use and timely upgrades are essential for improving patient outcomes, reducing healthcare costs, and curbing the rise of antimicrobial resistance.

The reason for postoperative antibiotic change raises concerns about long-term resistance trends, further emphasizing the role of regular prescription audits, antimicrobial stewardship programs, and adherence to national treatment guidelines (NCDC and ICMR). Our study provides a framework for continuous prescription audit of antibiotics in a hospital setting and thus can help in rational use of antibiotics in post-operative surgical patients.

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CONFLICT OF INTEREST: None

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