

**Original article:**

## **A Prospective study on Use of Antibiotics in Surgery Department at a tertiary care teaching hospital**

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**Abstract:**

**Introduction:** The use of antibiotics to prevent infections at the surgical site is known as the surgical prophylaxis. Appropriate antibiotic prophylaxis can reduce the risk of wound infections after surgery, but additional antibiotic use also increases the selective pressure favoring the emergence of antimicrobial resistance.

**Methods:** A prospective and observational study was carried out on 400 post-operative inpatients for a period of 12 months. A total of 400 patients were included in the study in which 166 (59%) male and 234 (41%) female.

**Results:** The total numbers of antibiotics used were 860 in which 37.1% of third generation cephalosporin and 31.4% of metronidazole were used. In the study five different combinations of antibiotics were prescribed. The most common surgery performed was appendectomy. The number of antibiotics per prescription on average basis was found to be 2.8 and the mean duration of days the antibiotics given to the patients was found to be 4.16 days during their stay in the hospital.

**Conclusion:** The study concludes that most common use of Cephalosporins and metronidazole seems to be effective in reducing the surgical site infection and other complications. Patients in surgical wards develop infections post-surgery; many of the infections are caused by bacteria that are highly virulent. As a result there is a need for prophylactic or empirical treatment with antibiotics that can cover broad spectrum of pathogens.

Keywords: Drug Utilization Pattern, Antibiotics, Surgery

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## Introduction

Antibiotics are the substances which selectively suppress the growth of or kill other microorganisms at very low concentration. This definition excludes other natural substances which also inhibit microorganism but are produced by microbes but are needed in higher concentration. <sup>[1]</sup>

Especially in intensive care and surgical department antibiotics are the most frequently prescribed drugs. To increase quality of care, infection control and cost containment certain programs designed to encourage appropriate antibiotic prescriptions in health institutions. <sup>[2]</sup> Antibiotics are one of the pillars of modern medical care and play a major role both in the prophylaxis and treatment of infectious diseases. The issues of their availability, selection, and proper use are of critical importance to the global community. <sup>[3]</sup>

As the use of antibiotics to prevent infections at the surgical site is known as the surgical antibiotic prophylaxis. It is an effective management strategy for reducing postoperative infections, provided that appropriate antibiotics are given at the correct time for appropriate durations and for appropriate surgical procedures. <sup>[4]</sup> Antibiotics are a scarce resource as current use decreases their future value. The balance between the positive effects of using antibiotics and the negative impact of this use on their temporal effectiveness has to be assessed. The strategies will be wide-ranging and encompass the development of new antibiotics, the use of alternative treatments and prevention of infectious disease. <sup>[5]</sup>

Commonly used surgical prophylactic antibiotics include:

- Intravenous 'first generation' Cephalosporins – cephazolin or cephalothin
- Intravenous gentamicin
- Intravenous or rectal metronidazole (if anaerobic infection is likely)
- Oral Tinidazole (if anaerobic infection is likely)
- Intravenous flucloxacillin (if methicillin-susceptible staphylococcal infection is likely)
- Intravenous vancomycin (if methicillin-resistant staphylococcal infection is likely).
- Postoperative wound infections have an enormous impact on patient's quality of life and contribute substantially to the financial cost of patient care. The potential consequences for patients range from increased pain and care of an open wound to sepsis and even death. <sup>[6]</sup>
- The main goals of prophylactic administration of antibiotics to surgical patients are to:
  - Decrease incidence of surgical site infection.
  - Use antibiotics in a manner that is supported by evidence of effectiveness.
  - Minimize the effect of antibiotics on the patient's normal bacterial flora.
  - Minimize adverse effects cause minimal change to the patient's host defenses. <sup>[7]</sup>

## Materials and methods

The study was conducted for a period of 1 year in the Department of General Surgery of Lord Buddha Koshi Medical College & Hospital, Saharsa from June 2012 till May 2013.

A hospital base prospective and observational study was carried out on 400 in post-operative inpatients. In this study the data was collected in the data collection form and current prescribing patterns of antibiotics in post-operative patients was reviewed.

A total of 400 in-patients from the In-patient department of general surgery in Lord Buddha Koshi Medical College & Hospital, Saharsa from June 2012 till May 2013, who were prescribed with the antibiotics after the major or minor surgery and those who fulfilled the exclusion and inclusion criteria were selected for the study.

The study was commenced after the approval from Institutional Ethical committee.

### **Study procedure**

A hospital based prospective study was conducted on In-patients in the general surgery department who have been operated for minor or major surgery and has been admitted in the In-patient surgery ward in the Lord Buddha Koshi Medical College & Hospital, Saharsa.

Statistical methods-

Data was also analyzed by using statistical software, SPSS version 17.

### **Result and discussion:**

An observational descriptive study was carried out in the hospital in 400 post-operative Patients in different wards. The study was undertaken to know the prescribing pattern of antibiotics in post-operative patients. During the 1 year of study period, 400 patients were enrolled. According to SIGN guideline the goals of prophylactic administration of antibiotics to surgical patients are to reduce the incidence of surgical site infection, use antibiotics in a manner that is supported by evidence of effectiveness, minimize the effect of antibiotics on the patient's normal bacterial flora, minimize adverse effects and cause minimal change to the patient's host defenses.<sup>[8]</sup>

In our study, amongst the total group of 400 patients, 166 (41.5%) were male and 234 (58.5%) were female. From the total number of patients the maximum number of patients operated for different surgeries were found to be 220 i.e. 55% lying under the age group of 15 to 45 years and the minimum group of patients admitted were 8 i.e. 2% of age group 70 to 85 years. The mean age of the patients was 33 years preponderance of female patients.

The average number of antibiotics per prescription was found to be 2.8 and the mean duration of days the antibiotics given to the patient was found to be 4.16 days during their stay in the hospital. A critical period for successful prophylaxis lies in the 4 hours following implantation of organism into wound for which one or two doses of anti -microbial drugs parentally may be sufficient.<sup>[3]</sup>

Five different antibiotic combinations were used. Single antibiotic was prescribed to 92 patients, two antibiotics were given to 194 patients, three for 90 patients and four antibiotics were prescribed for 24 patients per prescription.

The number of patients prescribed with only single antibiotics were found to be 270, 46 patients were prescribed only antibiotic drug combination and those who were prescribed both single and antibiotic drug combinations were found to be 84.

The findings of the present study, in this respect, was correlated with another study made by Sapna Patil et al which showed that most commonly prescribed class of anti-microbial agents was Cephalosporins which was prescribed in 134 patients (46.85%) and the second being metronidazole which was prescribed in 100 patients (34.66%).<sup>[9]</sup>Cefixime is most common drug used from the third generation Cephalosporins.

From the total 162 antibiotic combination of all the prescribed antibiotics, the most common prescribed antibiotic drug combination was found to be cefeperazone + Sulbactam i.e. 78 (47%), next is amoxicillin + clavulanic acid i.e 38

(23.4%) followed by cefuroxime + clavulanic acid i.e. 26 (16.04%). The least prescribed combinations were piperacillin + tazobactam and linezolid + cefixime i.e. 36 and 8 respectively.

**TABLE 1: PRESCRIBING PATTERN OF ANTIBIOTICS**

<b>Antibiotics</b>	<b>No of antibiotics used</b>	<b>% of antibiotics used</b>
<b>Aminoglycosides</b>	112	13.0
<b>Azithromycin</b>	2	0.2
<b>Cephalosporins</b>	382	44.5
<b>Fluoroquinolones</b>	18	2.0
<b>Lincosamides</b>	16	1.9
<b>Metronidazole</b>	264	30.7
<b>Oxazolidinone</b>	8	0.9
<b>β-lactam antibiotics</b>	58	6.8
<b>TOTAL</b>	<b>860</b>	<b>100.0</b>

In this study, it was found that 860 antibiotics were used in total of 400 patients, among which highest group of antibiotics prescribed were third generation cephalosporin comprising of 44% and then 30.7% metronidazole as shown in table 1. Hence the prescribing pattern of antibiotics in the post-operative ward was found to be aminoglycosides-112 (15%), azithromycin-1 (0.2%), cephalosporins-382 (44.5%), fluoroquinolones-18 (2%), lincosamides-8 (1.9%), metronidazole-264 (30.7%), oxazolidinones-8 (0.9%), beta-lactam antibiotics-58 (6.8%).

### **Conclusion**

The most commonly prescribed antibiotics in the post-operative in patient was found to be the third generation Cephalosporins followed by metronidazole. The use of Cephalosporins and metronidazole seem to be effective in reducing the surgical site infection and other complications.

There were no significant differences in prescribing the antibiotic with respect to age, gender, co-morbid, addictions, height, weight and different surgeries. We note that there was no difference in response of the patients of both who have been operated and those which developed surgical site infection.

1. Appropriate antibiotics used at the correct dose and with the appropriate frequency had reduced infectious post-operative complications and minimizing the development of antibiotics resistant organisms.
2. A regular review of the chosen regimen on the grounds of efficacy, toxicity and other aspects had been carried out to maximize the benefits to the patient. However, the use of prophylactic antibiotics had shown to reduce infectious morbidity in a safe manner.
3. A major comprehensive understanding of the common pathogens and the antibiotics they respond to is formulated to reduce the complications.
4. Post-operative wound infections have an enormous impact on patients' quality of life. The potential consequences for patients range from increased pain and care of an open wound to sepsis and even death.

5. Thus the antibiotic prophylaxis is only one relatively minor effort among numerous preventive measures, but the efficacy and impact of antibiotics prophylaxis has clearly been demonstrated to be significant.
6. Hence any benefit of antibiotics needs to be carefully weighed against the possible emergence of resistant bacteria, fungal colonization, risk of other adverse events and cost.

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