

Original Research Article

Prescription analysis of drug prescribed in post-operative period in a teaching hospital in Bhilai, Chhattisgarh, India

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ABSTRACT

Background: Surgical site infections are associated with prolonged hospital stays and increased cost of therapy. Prophylactic use of antimicrobials is to prevent the incidence of postoperative wound infection. To generate data on postoperative use of antimicrobials this study was planned.

Methods: The information was collected in semi-structured questionnaire format from the patient's case paper. Information regarding the antimicrobials prescribed by surgeon, including drug combinations, duration of therapy, frequency of drug administration, and diagnosis for the surgery was collected. Surgical wounds were classified based on National Research Council (NRC) criteria.

Results: Mean duration of antibiotic use was 3.71 days for clean surgeries (70%) and ranging from 2.67 days to 6 days for clean contaminated, contaminated and dirty types of surgeries. average number of antimicrobials prescribed for surgical antimicrobial prophylaxis was 3 per patients. Ceftriaxone, cefixime, ofloxacin, levofloxacin, amikacin, amoxicillin + clavulanic acid, ampicillin, metronidazole were used for postoperative prophylaxis.

Conclusions: As per guidelines, the usage of antibiotics was found to be inappropriate in some conditions. Third generation cephalosporin was the preferred or most prescribed choice of drug for postoperative prophylaxis. The average number of antimicrobials prescribed for postoperative prophylaxis was 3 per patients.

Keywords: Antimicrobial prophylaxis, Prescription analysis of antimicrobials, Postoperative use of antimicrobials

INTRODUCTION

The prescription order is an important transaction between the physician and the patient. The prescribing behavior of physician depends upon the input from various sources like patients, professional colleagues, academic literatures, commercial publicity and Government regulations.¹ Various prescribing errors are result of ineffective use of these inputs and are very common in clinical practices. The continuous monitoring of prescriptions and drug utilization studies may help to

identify the problems involved in therapeutic decision and promote the rational prescribing.²

Antimicrobials are used for prevention of postoperative infections. Patil et al, carried out a study to analyze prescribing pattern in head and neck cancer surgery patients and observed that combination of cefazolin and metronidazole was effective in treating post-operative wound infection in 39% of the patients. *Staphylococcus aureus*, *pseudomonas*, *anaerobes* and *klebsiella* were the organisms isolated from the wound. Reconstructive

procedures are generally safe owing to improvement in surgical skills and better antibiotic use.³ Surgical site infections (SSI's) account for approximately 15% of nosocomial infections and are associated with prolonged hospital stays and increased costs. The goal of prophylactic antibiotics is to reduce the incidence of postoperative wound infection.

There is lack of studies on postoperative use of antimicrobial prophylaxis in India. WHO had given Anatomical Therapeutic Classification for drug utilization studies and also defined Daily Defined Dose (DDD) for most of antimicrobial agents.⁴ These dosage are based on Western and US database of antimicrobial use. To generate our own Indian database for antimicrobial prophylaxis, there is need of large number of drug utilization studies in different parts of India. This an attempt to generate database for post-operative use of antimicrobials for prophylaxis.

Aims and objectives of the study was to analyze the drug pattern prescribed for surgical prophylaxis as per types of wounds and also to find out most commonly used group of drugs for postoperative prophylaxis. Also, aim to know the average number of antimicrobial drugs prescribed for postoperative prophylaxis.

METHODS

Information will be collected from the surgery wards of a tertiary care center. The information was collected in semi-structured questionnaire format from the patient's case paper who had taken antimicrobial therapy and who had undergone surgical procedure. Information regarding the antimicrobials prescribed by surgeon, including drug combinations, duration of therapy, frequency of drug administration, and diagnosis was collected. Surgical wounds were classified based on National Research Council (NRC) criteria (Table 1).⁵

Table 1: Classification of operative wounds with increasing risk of infection.

Clean	Elective, nontraumatic surgery, no viscera or tract (respiratory, g.i., biliary, genitourinary) entered, no infection at site, no break in technique.
Clean-contaminated	Otherwise clean but emergency surgery, or elective surgery with opening of any viscera/ tract but minimal spillage, no contact with infected material or minor break in technique.
Contaminated	Gross spillage from g.i. tract (gut resection), opening of infected biliary or genitourinary tract, penetrating injury < 4 hr old, grafting on chronic open wound, major break in technique.
Dirty	Opening of abscess or purulent site, preoperative perforation of g.i./respiratory/genitourinary tract/penetrating injury > 4 hr old.

Sample size and statistical analysis

In this study, data of the 40 patient who had undergone surgery was collected over the period of 2 months. Statistical analysis was done with the help of Microsoft excel software.

RESULTS

Mean duration of antibiotic use was 3.71 days for clean surgeries (70%), 2.67 days for clean contaminated, 6 days for contaminated and 3.8 days for dirty type of surgeries (Table 2).

Table 2: Classification of surgeries as per types of wounds.

Types of surgery	No. (%)	Average number of days for which antimicrobial prophylaxis was given
Clean	28 (70)	3.71 days
Clean contaminated	2 (5)	2.67 days
Contaminated	6 (15)	6 days
Dirty	4 (10)	3.8 days

Average number of antimicrobials prescribed for surgical antimicrobial prophylaxis was 3 per patients. ceftriaxone and amikacin were given by parenteral route and ofloxacin, metronidazole, levofloxacin, cotrimoxazole, cefixime, amoxicillin + clavulanic acid were given by oral route for postoperative prophylaxis of clean surgeries (Table 3). Cefotaxime, ampicillin and amikacin were given parenterally for prophylaxis of clean contaminated surgeries (Table 3). For contaminated and dirty surgeries piperacillin + tazobacam, metronidazole, ceftriaxone were given by parentally and levofloxacin and cefixime were given orally (Table 3).

There was some disparity in dose administered to patient per day and WHO daily defined dose (WHO DDD) (Table 3). Tab metronidazole was given 400 mg per day whereas WHO DDD was 2 grams and Inj cefotaxime was given 3grams/day whereas WHO DDD was 4 grams (Table 3). Inj piperacillin + tazobactam dose/day that was administered in this study was 18 gm, but WHO DDD is 14 grams (Table 3). Clean surgeries in this study were incisional hernia, benign hypertrophy of prostate, hypospadias, hydrocele, cystoscopy, uretero-lithotomy and dirty were Intestinal obstruction and liver abscess (Table 4).

Table 3: Antibiotics used for different types of surgeries.

Type of surgery	Antimicrobials used	Dose/day given	ATC Code	DDD
Clean	Inj Ceftriaxone	2 GM	J01DD04	2 GM
	Tab Ofloxacin	400 MG	J01MA01	0.4 GM
	Inj Amikacin	1 GM	Jo1GB06	1 GM
	Tab Metronidazole	600 MG	PO1AB01	2 GM
	Tab Levofloxacin	1 GM	J01MA12	0.5 GM
	Tab Cotrimoxazole	480 MG	J01EE01	1U BD
	Tab Cefixime	400 MG	J01DD08	0.4 GM
	Tab Amoxicillin + Clavulenic acid	1.125 GM	J01CR02	1 GM
Clean Contaminated	Inj Cefotaxime	3 GM	J01DD01	4GM
	Inj Ampicillin	2 GM	J01CA01	2 GM
	Inj Amikacin	1 GM	Jo1GB06	1 GM
Contaminated	Inj Piperacillin + Tazobactam	18 GM	J01CR05	14 GM
	Inj Metronidazole	1.5 GM	P01AB01	2 GM
	Tab Levofloxacin	1 GM	J01MA12	0.5 GM
Dirty	Inj Ceftriaxone	2 GM	J01DD04	2 GM
	Inj Metronidazole	1.5 GM	J01XD01	1.5 GM
	Tab Cefixime	400 MG	J01DD08	0.4 GM

Table 4: List of surgeries performed in each type of wounds.

Type of surgeries	Names of condition/surgeries
Clean	Incisional hernia, benign hypertrophy of prostate, Hypospadias, Hydrocele, cystoscopy, uretero-lithotomy
Clean contaminated	Choledochal cyst removal
Contaminated	Diabetic foot amputation, laporatomy for ileal perforation
Dirty	Intestinal obstruction, liver abscess

DISCUSSION

For surgical prophylaxis to prevent the postoperative infection, orally amoxicillin 2g (50mg/kg), cephalixin 2g (50mg/kg), cefadroxil 2g (50mg/kg), clindamycin 600mg (20mg/kg) given orally. Azithromycin 500mg (15mg/kg) or clarithromycin 500mg (15mg/kg) is given to patient allergic to penicillin. Parentally, (single injection just before procedure) drugs given are: ampicillin 2g (50mg/kg) i.m./i.v., cefazolin 1g (25mg/kg) i.v., vancomycin 1g (20mg/kg) i.v. (in MRSA prevalent areas and/or penicillin allergic patients), clindamycin 600mg (20mg/kg) i.v. (for penicillin allergic patients).⁶ Cefuroxime 1.5g (30mg/kg) i.v. + metronidazole 0.5g (10mg/kg) i.v. and gentamicin 160mg (3mg/kg) i.v.+ metronidazole 0.5g (10mg/kg) i.v. are given for patient undergoing gut and biliary surgery.⁶

In case of contaminated and dirty wounds (including road side accidents), the antimicrobial regimens are generally administered for 5 days. Followings are the regimens:

- Cefazolin 1 g i.v. 8 hourly + vancomycin 1 g i.v. 12 hourly,
- Cefoxitin 1 g i.v. 6 hourly/ceftizoxime 1 g i.v. 12 hourly,

- Clindamycin 0.6 g i.v. 8 hourly + gentamicin 80 mg i.v. 8 hourly,
- Ampicillin 2 g i.v. 6 hourly/vancomycin 1 g i.v. 12 hourly + gentamicin 80 mg i.v. 8 hourly + Metronidazole 0.5 g i.v. 8 hourly ,
- Amoxicillin 1 g + clavulanate 0.2 g i.v. 12 hourly.⁶

Excessive and inappropriate use of antibiotics in health care facilities and the communities contributes to development of antibiotic resistance. Multiple antibiotics are available and information about antibiotic use pattern is necessary to formulate a constructive approach to the problem of inappropriate drug use.⁷

Appropriate surgical antibiotic prophylaxis can reduce the postoperative wound infection. Inappropriate use leads to the development of antimicrobial resistance.⁸ The antibiotic is either given at the wrong time or continued for a long period.⁹ A previous study carried out in two hospitals in Pokhara city, western Nepal had shown variations in the antibiotic use in surgical antibiotic prophylaxis and noted that the hospitals rarely met the international guidelines for surgical antibiotic prophylaxis.¹⁰

Mean duration of antibiotic use was 3.71 days for clean surgeries (70%) and ranging from 2.67 days to 6 days for clean contaminated, contaminated and dirty types of surgeries. Average use of antimicrobial use for 6.4 days reported from Taiwan.¹¹ Standard recommendation for surgical prophylaxis is single dose in special circumstances like clean surgeries.⁶

There was difference in daily dose administered to the patient and WHO DDD in this study (Table 3), suggesting that, we cannot follow WHO DDD in Toto for Indian population and there need for finding our own DDD suitable for Indian population.

Average number of drugs per prescription is an important indicator. This will help to avoid the drug-drug interactions, development of bacterial resistance and increase in hospital cost. In this study, the average number of antimicrobials prescribed for surgical antimicrobial prophylaxis was 3 per patients. This is similar to that reported by Deshmukh et al.¹² Similar type of finding were observed by two other studies which had shown average use of drug per patient in the range of 2.5 to 3.02.^{13,14} Appropriate antibiotic prophylaxis can reduce the risk of wound infections after surgery, but additional antibiotic use also increases the selective pressure favouring the emergence of antimicrobial resistance.

CONCLUSION

As per guidelines, the usage of antibiotics was found to be inappropriate in some conditions. Third generation cephalosporin was the preferred or most prescribed choice of drug for postoperative prophylaxis. ceftriaxone, cefixime, ofloxacin, levofloxacin, amikacin, amoxicillin + clavulanic acid, ampicillin, metronidazole were used for postoperative prophylaxis in this study. The average number of antimicrobials prescribed in surgery department was 3 per patients. Amoxicillin and clavulanate was fixed drug combination that was prescribed maximally.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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