ORIGINAL RESEARCH

Current use of antibiotics in elective surgeries in general surgery in tertiary care teaching hospital

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ABSTRACT
Irrational use and prescription pattern of antibiotics are among the major causes of increasing rate of development of their resistance. Most of the developing countries have constituted strict guidelines regarding prescribing and usage of antibiotics to combat a serious issue like antibiotic resistance. WHO has given guidelines for appropriate use of available antimicrobial drugs. This study was taken to evaluate the pattern of use of antibiotics in elective surgeries in the department of General Surgery of D.Y Patil Hospital and Research Institute to analyze the depth of rationality regarding their usage. Total 50 patients undergoing elective surgeries were taken to complete this study. Data were figured out under various aspects & those aspects are: (a) Gender wise distribution of the patients, (b) Age wise distribution of the patients, (c) Distribution of the patients according to age group & gender, (d) Usage of group of antibiotics according to system wise surgeries. (e) Usage of group of antibiotics according to operative period. (f) Usage of group of antibiotics according to route of administration, (g) Usage of antibiotics in different strengths and dosage forms, (h) Usage of antibiotics in different frequencies. Following observations were made from the obtained result :-

(1) Half of the admissions were observed in the geriatric age group and were lowest in the age group of less than 20 years.
(2) Almost equal numbers of male and female patients were admitted.
(3) The most commonly used antibiotics are Cefotaxime & Amoxicillin.
(4) In case of requirement of the 2nd antimicrobial, metronidazole and Piperacillin Tazobactam combination were used.
(5) In pre and post operative period there was no change in frequency. But in pre operative period duration of use of antibiotics was mostly 2-3 days, whereas in post operative period duration range was from 5-10 days.
(6) In preoperative period for long surgeries, surgery department administered all antibiotics twice daily, but in case of small surgeries single dose of antibiotics was preferred as prophylaxis.
(7) Patients who were less than 20 years of age were given cefotaxime in 500mg strength.
(8) The preferred route for giving surgical prophylaxis in elective surgeries was parenteral.

Keywords: Antibiotic, Antimicrobial, Antibiotic prophylaxis, Pre & Post Operative Period.

INTRODUCTION

Antimicrobial drugs are the greatest discovery of the 20th century to therapeutics as well as to the society. Their importance has increased in the developing countries like India, where the growing prevalence of infectious diseases is an important cause of increased morbidity and mortality. As a result antimicrobials are one of the most frequently used as well as misused drugs.[1]

Antibiotic resistance is an important issue since many years and it is increasing gradually with time. It is defined as unresponsiveness or diminished responsiveness of a bacteria to a particular antibiotic agent. Bacterial resistance is of huge concern because if resistant strains are developed than a useful antibiotic becomes useless.[2]

According to the Infectious Diseases Society of America, rational use of antibiotics requires the use of antibiotics with the appropriate medication that could influence the clinical needs of patients in certain geographic areas with the lowest side effects.[3] The availability and affordability of good quality antibiotics along with their rational use is required for positive therapeutic results.[4] However, irrational

antibiotic use is prevalent, especially in the developing countries like India due to inadequate knowledge, irrational prescription and inappropriate administration as well. Also, the World Health Organization (WHO) reported that more than half of all medicines are prescribed, dispensed or sold inappropriately and that half of all patients failed to take them correctly.[5]

Surgical site infection is the most common post-operative complication and represents a significant burden in terms of patient morbidity and mortality and cost to health services around the world.[6]

But lack of knowledge among health care professionals about antibiotics regarding their generic names, dosage, and route of administration, frequency and duration is a major barrier for their rational use. Besides this in India most of the hospitals don't have proper established guidelines regarding the use of antibiotics. As a result, the in-hospital use of antibiotic drugs has been a major concern in the last few decades worldwide especially in developing countries. Excessive and inappropriate use of antibiotics in hospitals, health care facilities and the community contributes to the development of bacterial resistance.[7]

Therefore, with the aim of reducing antibiotic resistance and irrational use of antibiotics this study was carried out in D.Y Patil Hospital and Research Institute, Kolhapur. A prescription oriented survey was considered to be one of the best ways to analyze the pattern and rational use of antibiotics. This study will also help to institute a protocol for appropriate use of antimicrobials in this hospital.

MATERIAL & METHODS

Study Design

This was a non-interventional, prospective, descriptive observational study. "A point of time study" was undertaken whereby all the admitted patients in General Surgery department were planned for elective surgeries on a particular day of a week, i.e. point of time, and were considered and only they were included in the study.

Study Site

The study was conducted in D.Y Patil Hospital and Research Institute, Kolhapur. Data was collected from the department of General Surgery.

Study Duration

This was a twenty four month study from September 2018 to September 2020.

Sample Size

Total fifty patients who were planned for elective surgeries during the study period, i.e. from September 2018 to September 2020 were collected.

Inclusion Criteria

Adult patients of either sexes from the department of General surgery who underwent elective surgeries were included in this study. All the antibiotic regimens, those patients had received from the date of admission to date of discharge were collected and evaluated accordingly.

Exclusion Criteria

a) Patients on anticancer therapy.
b) HbsAg positive patients.
c) HIV positive patients.
d) Patients who were on steroid therapy.
e) Medicolegal cases.

Data Collection

50 patients were selected randomly who underwent elective surgery in the department of general surgery. Patient's records were evaluated from indoor ward files and data regarding prescribed antibiotics were collected in self-designed data record sheet. All collected records in designed datasheet were given codes. Demographic data of patients including name, age, sex, marital status, address, contact number, I.P.D number, date of admission, date of operation were recorded. The diagnosis of each patient and type of surgery were noted from the patient's records. To analyze the pattern of use of antibiotic, name of prescribed antibiotics, including their brand and generic name, indication, dose, route, frequency, duration were recorded and evaluated accordingly. The information regarding antibiotics was recorded separately according to operative period.

Data Analysis Tools

a) A self-structured data sheet was made to keep collected information of patients.
b) For every selected patient separate data sheet was used to gather information.

Statistical Analysis

The Statistical Package for Social Sciences (SPSS) version 14.0 was used for all statistical analysis. For categorical variables, data was expressed as number and percentage and pie charts and bar charts were used.

RESULTS & OBSERVATIONS

Table no 1: Gender wise distribution of patients

		Department
		Surgery
Gender	Male	26 (25.7%)
	Female	24 (24.2%)
Total		50

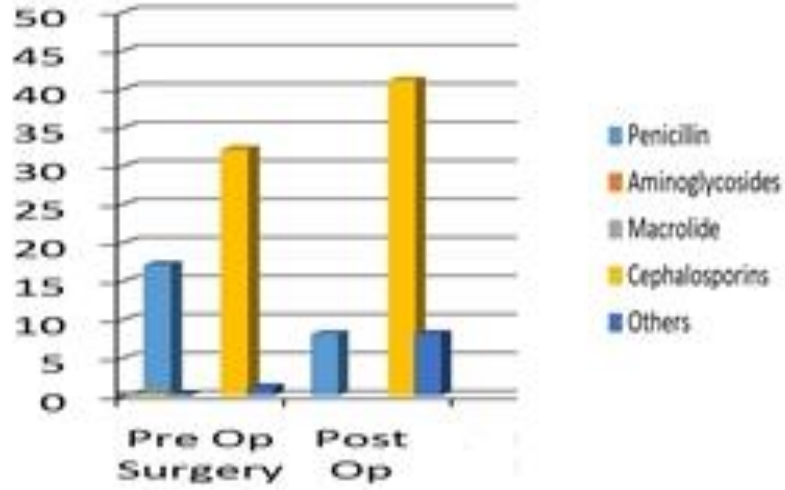
Table no 2: Distribution of patients according to age group

		Department
		Surgery
Age group (Years)	< 20	8 (29.6%)
	21-30	8
	31-40	7
	41-50	7
	51-60	6
	>60	14
Total		50

Table no 3: Usage of group of antibiotics according to system wise surgeries

Group	Department			
	Surgery			
	T (n%)	A (n%)	P (n%)	Total(n%)
Penicilin	0	5(27.8)	13 (72.2)	18 (36)
Aminoglycoside	0	0	0	0
Macrolide	0	0	0	0
Cephalosporins	0	32(74.4)	11(25.6)	43 (86)
Others	0	7(87.5)	1(12.5)	8 (16)
T = Thoracic A= Abdominal P= Perineum				

Graph no 1: Usage of group of antibiotics according to operative period



Graph no 2: Usage of group of antibiotics according to route of administration

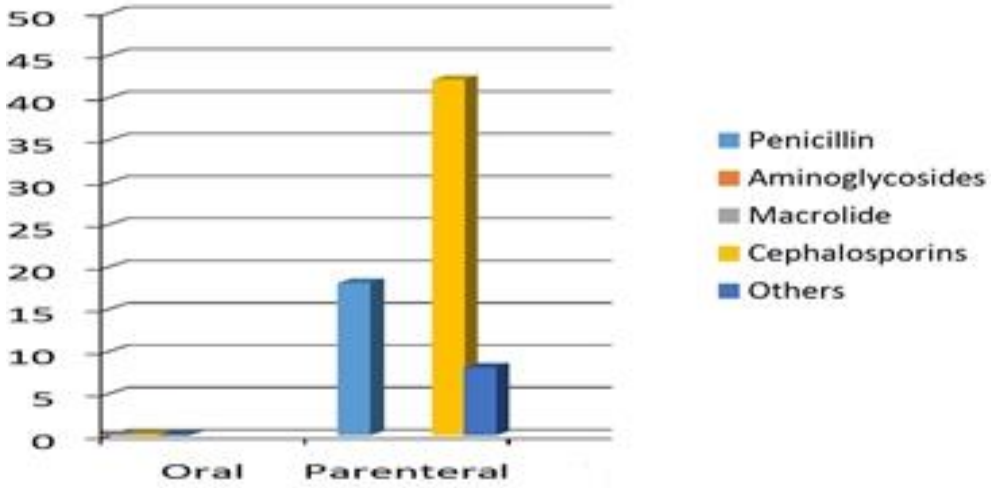
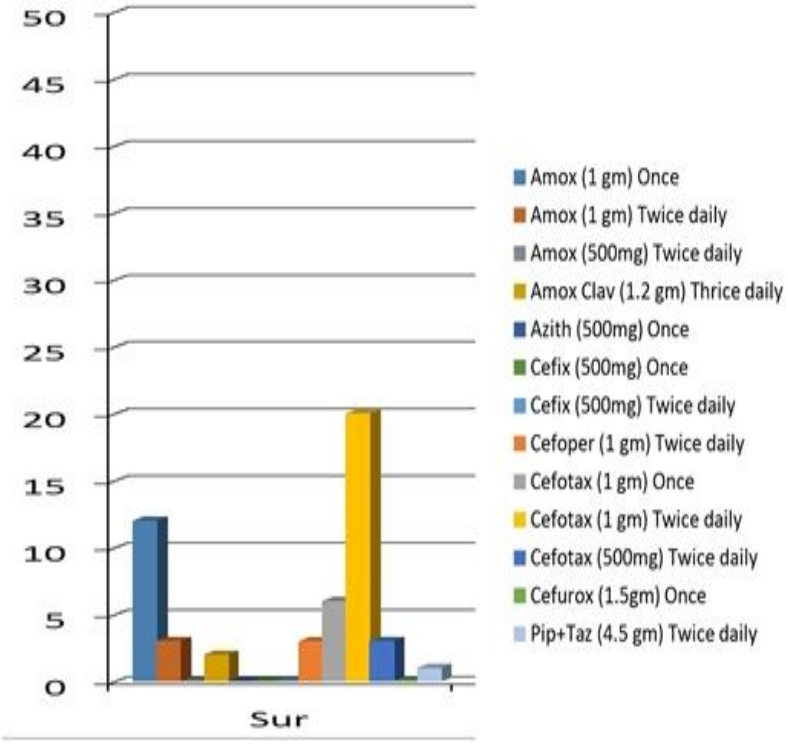


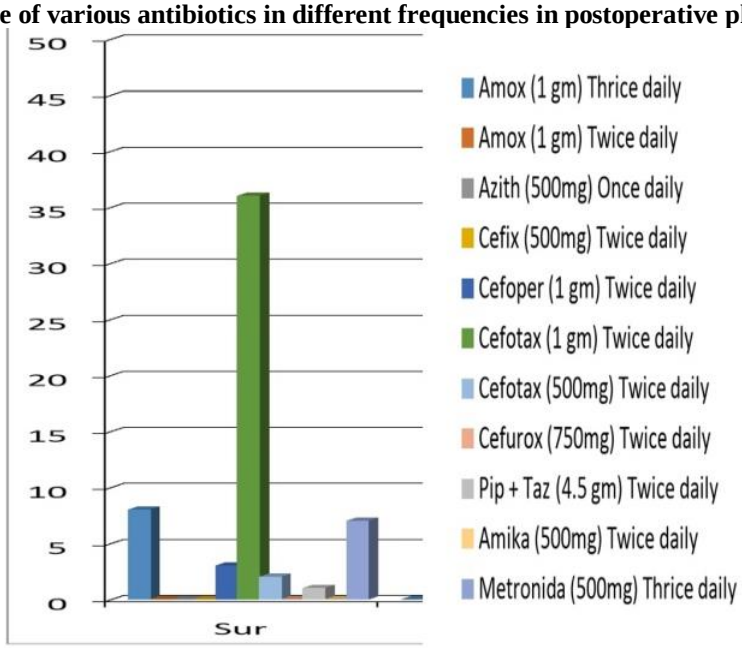
Table no 4: Usage of antibiotics in different strengths and dosage forms

Group	Department		
	Surgery		
	Pre-op n (%)	Post-op n(%)	Total n (%)
Amoxicillin (1g)	15	8	23
Amoxicillin Clavulanic P(1.2g)	2	0	2
Cefoperazone (1g)	3	3	6
Cefotaxime (500mg)	3	2	5
Cefotaxime (1g)	26	36	62
Metronidazole (500mg)	0	7	7
Piperacillin + Tazobactam 4.5 Gm	1	1	2

Graph no 3: Usage of various antibiotics in different frequencies in preoperative phase



Graph no 4: Usage of various antibiotics in different frequencies in postoperative phase



DISCUSSION & CONCLUSION

The period between the 1950s and 1970s, was without a doubt the best period of emergence of novel antibiotic classes, with no new classes found from that point forward. Thus, with the reduction in the emergence rate, the standard approach for the advancement of new antibiotics has been the structural alteration of existing antibiotics.[8] Although scientists are trying to discover newer classes of antibiotics, extra efforts are needed to conserve the existing classes of antibiotics.[9]

Surgical site infection is the commonest post-operative complication and a major reason for increasing rate of morbidity and mortality, and as a result cost of health services is also increasing globally. Appropriate antibiotic use prophylactically as well as therapeutically can reduce the incidence of surgical site infection.[10]

Administration of a single preoperative dose is enough for an intraoperative period of 4 hours.[11] But in case of complicated as well as prolonged operations, subsequent doses may be necessary to keep a constant drug concentration in blood. In a study of the year 1994, **Dellinger E.P. et al.,** stated that it is very difficult to come to a conclusion regarding the duration and indication issues of antibiotic prophylaxis in surgeries.[12]

Approximately 30–50% of antibiotic use in hospital practice is now for surgical prophylaxis. However, between 30% and 90% of this prophylaxis is inappropriate. Most commonly, the antibiotic is either given at the wrong time or continued for too long.[13]

Therefore, to combat against antibiotic resistance and their irrational usage, their utilization studies are being carried out.[4] So, keeping all those issues in mind, this study was carried out in D.Y Patil Hospital and Research Institute to analyze the pattern of antibiotic use regarding their indication, route, dosage and rationality in elective surgeries of General Surgery department and to generate an appropriate hospital specific guidelines for effective antibiotic use. Vigorous comparison with other relevant studies has been done during the study period and also after obtaining the result of this study before coming to a satisfactory conclusion.

In our study half of the admissions were observed in the geriatric age group and were lowest in the age group of less than 20 years.

In a study done by Bhansali N.B. et al., in 2013, the lowest number of admissions were found in geriatric age group i.e. >60 years (8.2%).[14] In this study almost equal numbers of male and female patients were admitted. In a study done by Shah S.K. et al., in 2016, who reported that males (51.67%) and females (48.33%) in their study population, which was approximately in equal proportion.[15] In our study it was found that the most commonly used antibiotics were Cefotaxime & Amoxicillin. In case of requirement of the 2nd antimicrobial, metronidazole and Piperacillin Tazobactam combination were used.

In a study done by Joshi D.K. et al., it was revealed that cephalosporins with or without beta lactamase inhibitors were the commonest used antibiotic (65%) in the department of surgery where the sample size was 100.[16] In that study they also found that the second commonest used antibiotic group was penicillin (amoxicillin) which was similar with our finding. In pre and post operative period there was no change in frequency. In preoperative period for long surgeries, surgery department administered all antibiotics twice daily, but in case of small surgeries single dose of antibiotics was preferred as prophylaxis. But in pre operative period duration of use of antibiotics was mostly 2-3 days, whereas in post operative period duration range was from 5-10 days. These findings regarding the frequency pattern of various antibiotics were correlating with the various standard guidelines of antibiotic use.[17-18]

Patients who were less than 20 years of age were given cefotaxime in 500mg strength. In our study the preferred route for giving surgical prophylaxis in elective surgeries was parenteral. Rehan H.S. et al., in their study, revealed that the preferred route of administration of antibiotic prophylaxis was parenteral, except in ocular surgeries, where oral and topical routes were given preference.[19]

Considering the limitations of this study, it was very difficult to give a definitive conclusion regarding the rational use of antibiotics in a tertiary care hospital as the study population and the study period both were less in comparison to such a metaanalysis. During data collection with some limitations, we gathered some helpful information regarding the overall pattern of antibiotic use as well as antibiotic prophylaxis. The incidence of antibiotic prescribing error was found to be lower and no life threatening events were observed during this study. It was also revealed that, General surgery department used to give test dose before administrating the actual prescribed dose to all patients. Besides this, some inappropriateness regarding the usage of antibiotics were found and those issues need to be corrected as early as possible. Although this hospital has its own established specific guidelines regarding the rational use of antibiotics, our data will be helpful to review it periodically according to the status of drug sensitivity and resistance. Involvement of clinical pharmacologists in the hospital will give more wightage for analyzing the utilization pattern of antibiotics more appropriately as well as for establishing continuous updated hospital specific guidelines regarding the use of drugs. More interactions, discussions and exchange of ideas are required among clinicians, surgeons and clinical pharmacologists for periodical update of hospital strategies regarding antibiotic use .It is also very important to perform periodical awareness programmes by the authority to aware and educate the medical students, interns and other junior health care professionals regarding the importance of rational prescribing and appropriate use of antibiotics. Lastly,

we want to conclude that our fight should be against the serious issue i.e. “Drug resistance” and should not be against any authority or any individual.

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