



## Pharmacology

## DRUG UTILIZATION STUDY OF ANTIMICROBIAL DRUGS AMONG POST OPERATIVE PATIENTS IN DEPARTMENT OF GENERAL SURGERY AT A TERTIARY CARE HOSPITAL– A PROSPECTIVE OBSERVATIONAL STUDY”

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### ABSTRACT

**Background and Aims:** There are many studies carried out in India on inpatient department of General Surgery. Very few studies are available on postoperative care. Hence present study was undertaken for analysing and study the prescription patterns and review the role of various drugs prescribed to postoperative patients in order to improve patient's compliance using WHO core prescribing indicators **Materials and Methodology:** This is a prospective, observational study was carried out in department of pharmacology in association with General Surgery at tertiary care hospital G.M.C.H. Aurangabad after approval from Institutional Ethics Committee. Data obtained from case records forms, includes patients' demographic details and drugs prescribed. Data so collected was tabulated and analyzed accordingly. **Results:** This study was conducted in a tertiary care teaching hospital over a period of 18 months. A Total of 374 prescriptions were studied. The majority of patients belong to the age group of 40- 49 years. Fixed dose combination Amoxicillin + Clavulanic acid was the most prescribed antimicrobial i.e. 90.4%. Maximum prescriptions 124(33.2%) contained 3 antimicrobials. Majority of 13(81%) antimicrobials were prescribed with generic name. All antimicrobials were part of National List of Essential Medicines 2022. Majority of 10 (52.7%) antimicrobials were administered by intravenous route. **Conclusion:** The present study reflects the general trend of antimicrobial drug prescription among post operative patients in surgical ward of tertiary care centre. Rational antimicrobial prescription practice among surgeon will not only help to reduce incidence of surgical site infections but also avoid development of antimicrobial resistance which in turn will indirectly help in reducing cost of overall therapy and reduce economic burden of treatment part.

**KEYWORDS :** Drug utilization study, Postoperative Patients, WHO Core Prescribing Indicators, Generic name.

### INTRODUCTION

Antimicrobial agents are some of the most widely, and often in judiciously, used therapeutic drugs worldwide. The etiology of postoperative wound infection is complicated by the heterogeneous nature of these infections. Indiscriminate antimicrobial use is one of the greatest contributors to antimicrobial resistance. A low level of asepsis in hospitals and inadequate laboratory support have been adduced as reasons for indiscriminate use of antimicrobials among surgical patients. Patients in surgical wards develop infections post-surgery; many of the infections are caused by bacteria that are highly virulent. Antibiotics are one of the pillars of modern medical care and play a major role both in the prophylaxis and treatment of infectious diseases. In India the prevalence of use of antimicrobials varies from 24-67%. Because of the rising costs in health care, lack of uniformity in prescribing attitudes and the emergence of antibiotic resistance, monitoring and controlling antibiotic use is needed. A clear antibiotic policy is essential for preventing the rapid and wide- spread development of resistance, focused on empirical antibiotic therapy, prophylactic and long-term use of antibiotics. Hence antimicrobial use has to be streamlined in India and the only way to achieve the goal is to introduce antibiotic guidelines in every hospital. Drug utilization Studies are important tools for identifying those factors of the therapeutic chain in need of improvement or change. The study of prescribing pattern is a component of medical audit, which seeks to monitor evaluate and if necessary, suggest modification in prescribing practices of Prescriber to achieve rational and cost-effective medical care. World Health Organization (WHO) formulates a set of “core prescribing indicators” which aims at improvement of rational drug use for outpatient practices. The information on the antibiotic use patterns is necessary to make a constructive approach to the problems that arise from the multiple antibiotics which are available. One of the strategies to curtail AMR and promote rational use of AMAs is to frame local AMA policies. For formulation and monitoring of such policies, data on AMA utilization patterns are crucial. Unfortunately, data on antimicrobial utilization are frequently unavailable. Among pharmacotherapeutics, antimicrobials have a major impact on the outcome and severity of illness in patients.

With the above background information, the present study tend to evaluate the patterns of antimicrobial drug prescribing practices in

treatment of postoperative patients in General surgery department of a tertiary care hospital.

### MATERIAL AND METHODS

#### Study Design

This is a prospective Observational study.

#### Study population

All case record of postoperative cases for a period of 18 months from Jan 2021 – June 2022 of department at G.M.C.H. Aurangabad were enrolled

#### Study site

Department of General Surgery in association with department of pharmacology at tertiary care hospital.

#### Sample size

All case record of postoperative cases of for a period of 18 months from Jan 2021 – June 2022.

#### Informed consent

As there is no direct involvement of the patient's, informed consent is not applicable. Still a blanket consent is taken from Head of the department of General surgery. However, data regarding patients is kept confidential.

#### Inclusion Criteria

1 Patients of either sex above 18 years age who have undergone surgical procedure and were admitted to indoor ward.

#### Exclusion Criteria

- 1 Patients who died on table or in postoperative period before being discharge.
- 2 Patients who absconded or discharge against medical advice or who were referred to higher center.
- 3 Paediatric patients.

#### Study Procedure

All case records coming under the inclusion criteria has been studied. The case records will be taken from the record section of the hospital

after obtaining no objection Certificate from concerned department. All the details of the treatment given to the patients has been recorded.

Data so collected will be tabulated and analysis has been done accordingly.

### Statistical Analysis

The data obtained is analysed in Microsoft categorical data is expressed as percentage.

### Ethical Approval

This study was approved by the Institutional Ethics Committee of Government Medical College, Aurangabad, Maharashtra India.

### RESULTS AND OBSERVATION

This study was conducted in a tertiary care teaching hospital in Marathwada region of western India over a period of 18 months (1st Jan 2021 to 30th June 2022). A Total of 374 prescriptions were studied. Observations of the study are presented in the form of different tables and figures.

#### 1. DEMOGRAPHIC PROFILE

**Table 1. Gender (sex) wise distribution of study patients:**

	Gender Distribution	Percentage
Female	118	31.60%
Male	256	68.40%
Total	374	100

Study showed majority of male patients 254(68.4%), female study subjects were 118(31.6%).

**Table 2. Age wise distribution of study patients**

Age (Years)	Female (n)	Male(n)	Total
18-29	24	48	72
30-39	28	52	80
40-49	26	60	86
50-59	22	40	62
>59	18	56	74
Total	118	256	374

Study showed overall maximum number of patients between age group of 40-49 years. Maximum number of male patients 60 (69.7%) were in the age group of 40-49 years where as maximum number of female patients 28 (35%) were in the age group of 30-39 years.

**Table 3: Different types of Surgeries with their mean duration of hospital stay**

Type of surgery	No of surgeries (n)	Mean hospital stay (Days)
Appendectomy	88	8.4
Hernioplasty	21	9.6
Cholecystectomy	7	12
Exploratory Laparotomy	19	14
Excision	12	4.7
Incision and Drainage	44	9.1
Debridement	71	10.8
Thyroidectomy	10	13
Amputation	24	14
Mastectomy	12	17
Others	30	9.7

Appendectomy 88(23.5%) was the most common surgery performed followed by debridement 71(18.2%) while least cases of surgical interventions were Thyroidectomy 10(2.6%).

**Table 4. Percentage wise Distribution of Antibiotics**

Group of antibiotics		Number of encounters (527)	Percentage
BETA LACTAM	Ceftriaxone	65	17.37%
	Meropenem	17	4.4%
	Cefotaxime	92	24.60%
AMINOGLYCOSIDE	Amikacin	47	12.56%

QUINOLONES	Ciprofloxacin	123	32.8%
	Levofloxacin	8	2.14%
MACROLIDE	Azithromycin	7	1.8%
OXAZOLIDINONES	Linezolid	22	5.88%
ANTIAMOEBIAC	Metronidazole	230	61.50%
ANTHELMINTIC	Albendazole	4	1.07%
TETRACYCLINES	Tab Doxycycline	8	2.14%
NITROFURAN	Nitrofurantoin	10	2.67%
LINCOSAMIDE	Clindamycin	13	3.4%
FIXED DOSE COMBINATION	Amoxicillin Clavulanate	338	90.37%
	Piperacillin+	68	18.18%
	Tazobactam		
	Trimethoprim+ Sulphamethoxazole	4	1.07%

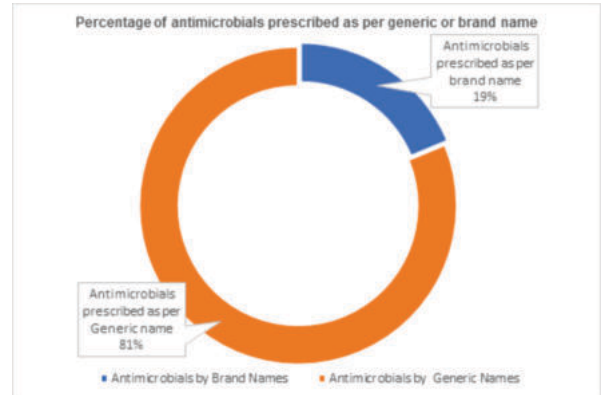
Fixed dose combination Amoxicillin + Clavulanic acid was the most prescribed antimicrobial followed by Metronidazole.

**Table 5. Number of antimicrobials per prescription**

No of Antibiotics per prescription	Total no of prescription (n)
1	64
2	87
3	124
4	53
5	24
>5	22
Total	374

Out of total 374 prescriptions, Maximum prescriptions contained 3 antimicrobials followed by two antimicrobials.

**Fig 6. Percentage of Antimicrobials prescribed as per generic or brand name**



Out of total 16 antimicrobials, 3(19%) antimicrobials were prescribed with brand name whereas majority of 13(81%) antimicrobials were prescribed with generic name.

**Table 7. Duration of antimicrobials as per route of administration**

Drugs	Route	Frequency of Prescription	Average duration (Days)
Ceftriaxone	Intravenous	64	4.1
Meropenem	Intravenous	17	5
Cefotaxime	Intravenous	93	3.9
Amikacin	Intravenous	47	5.4
Ciprofloxacin	Intravenous	57	4.9
Ciprofloxacin	Oral	66	3.8
Levofloxacin	Oral	4	3.7
Linezolid	Intravenous	22	5.5
Metronidazole	Intravenous	184	4
Metronidazole	Oral	46	3.8
Albendazole	Oral	4	3.7
Tab Doxycycline	Oral	8	5
Nitrofurantoin	Oral	10	3.8
Clindamycin	Intravenous	8	2.8
Clindamycin	Oral	6	5.3
Amoxicillin Clavulanate	Intravenous	204	4.2

Amoxicillin Clavulanate	Intravenous	204	4.2
Amoxicillin Clavulanate	Oral	135	4.4
Piperacillin+ Tazobactam	Intravenous	68	4.2
Cotrimoxazole	Oral	4	4

## DISCUSSION

Antimicrobial class of drugs are very crucial agents for treating or preventing development of infections in patients. Infections in the postoperative ward are commonly caused by bacteria's that are highly virulent. The use of antibiotics in surgical patients both for prophylaxis and treatment of infections is a justifiable practice, however requires a regular review of the chosen regimen on grounds of efficacy, diagnosis pattern, prescribing pattern and the aspects to maximize the benefits to the patients.

This prospective study assess the general pattern of how antibiotics used in surgical wards which were conducted for of 18 months, where 374 patients were enrolled in accordance to the studies inclusion criteria.

## Demographic profile

In this study maximum proportion of patients were male (68.4%), which is similar to which is similar to study conducted by Kumar et al. and Alam et al.<sup>17</sup>. Overall, majority of the patients were in age group of 40-49 years 86 (22.9%) followed by 30-39 years 80(21.3%). This finding is comparable to studies done by Bhansali et al. and Raut et al.<sup>16</sup>. However, this finding differs with that of Alam et al. and Javed et al, where majority of patients were below 40 years<sup>19</sup>. This could be because pediatric age group was excluded in our study.

Appendectomy 88(23.5%) was the most common surgery performed followed by debridement 70(18.7%). kamal et and al Bhatti et al also reported similar finding<sup>17</sup>. Overall mean duration of hospital stay was found to be 10.11± 3.35 (S.D) days. This comparable to studies done by Alam et al (9.2 days) and Bhansali et al (9 days)<sup>16</sup>. The extended length of stay reflects the severity of the illness and surgical complications.

Fixed dose combination Amoxicillin + Clavulanic acid was the most prescribed antimicrobial i.e., 338 times (90.4%) followed by Metronidazole 230 times (61.5%) in total of 374 prescriptions. This is in contrast to other studies<sup>16,20</sup>, where 3<sup>rd</sup> generation cephalosporins and metronidazole were most commonly prescribed antibiotics. Local resistance pattern, surgeon's own experience at hospital setting and availability of AMAs in our own government medical store might influence the choice of anti-microbial.

Average number of antibiotics per prescription were 2.80, which is comparable to study done by Bhansali et al and Arshad et al<sup>20</sup>. The higher number of antibiotics per patient indicates that more and more antibiotics were used for prophylaxis purpose rather than definitive treatment purpose. It is used more as a blanket therapy to prevent any or all types of infection. This not only leads to the increased cost of therapy but also to increased incidence of adverse drug reactions and to the selection of drug-resistant bacterial strains.

In our study majority (81%) of antimicrobials were prescribed with generic name. This is in line with Vidisha et al and Siddhartha et al<sup>23</sup>. This shows that physicians were aware of the low cost of the generic medicines and they were sensitive in keeping in mind that in government setup most of the patients were from lower socioeconomic status. It also avoids prescription errors.

All antimicrobials were part of National List of Essential Medicines 2022. The primary purpose of NLEM is to promote rational use of medicines considering three important aspects i.e. cost, safety and efficacy. Furthermore, it promotes prescription by generic names.

Mean duration of antimicrobial prescription were found to be 4.6 ± 0.9 SD days. This is in contrast to study done by Madhholkar et al where average duration of antimicrobial therapy was 7.92±3.5 days. This suggests that patients in clean contaminated, contaminated, and dirty wound surgeries need more antimicrobial therapy duration compared to clean wound surgeries.

Majority of 10 (52.7%) antimicrobials were administered by intravenous route while 9 (47.3%) antimicrobials were administered by oral route of drug administration. This is in line with study

conducted by Vidisha et al and Jitendra et al<sup>23</sup>.

Strict antibiotic prescription policies have to be developed and target must be aimed to minimize the incidence of resistance to antimicrobial agents and also to promote infection control practices and rational antibiotic utilization.

## SUMMARY AND CONCLUSION

The present study reflects the general trend of antimicrobial drug prescription among post operative patients in surgical ward of tertiary care centre. A total of 374 prescriptions were analysed.

The present study was conducted in the Department of Pharmacology in association with the Department of General Surgery in tertiary health care center of Marathwada region.

- Our study is contributing a general overview about the use of Antibiotics in post-operative patients in surgical ward. Most common surgeries performed were Appendectomy (23.5%), followed by Debridement (18.5%).
- Amoxicillin clavulanic acid (90.4%), Metronidazole (61.5%), Ciprofloxacin (34.6%) and Cefotaxime (24.6%) were the most commonly used Antibiotics.
- Average number of antibiotics per prescription was 2.8.
- Average duration of antibiotic use was 4.6 days.
- Average duration of stay was 10.2 days.

Rational antimicrobial prescription practice among surgeon will not only help to reduce incidence of surgical site infections but also avoid development of antimicrobial resistance which in turn will indirectly help in reducing cost of overall therapy and reduce economic burden of treatment part.

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