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STUDY OF UTILIZATION OF ANTIMICROBIAL AGENTS IN SURGICAL UNITS AT A TERTIARY CARE TEACHING HOSPITAL

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Abstract:

The World Health Organization (WHO) addressed drug utilization as the marketing, distribution, prescription and use of drugs in a society, considering its consequences, either medical, social, and economic. To determine the prescribing patterns of antimicrobial agents. To study commonly prescribed antibiotics in surgery department. To identify medication related problems & medication errors. To study about rational usage of antimicrobials. Surgical Unit-1 & Surgical Unit-2. The study is planned over a 6months period. Frequently used antimicrobial agents are Ceftriaxone 50 (12.5%) and Ciprofloxacin 40 (10%) and less frequently used antimicrobial agents are Colistin 03 (0.75%) and Azithromycin 05 (1.25%). most frequently used Antimicrobial combination are Amoxicillin+clavulanic acid 15(30%) and cefoperazone + salbactum 10 (20%) and less frequently used antimicrobial combination are Imipenum + cilastatin 03 (6%). Amoxicillin clavulanate was resistant to microorganisms in most of the cases (26.6%). Study on organisms prevailing and its sensitivity pattern of Anti microbial agents in the surgical department units will help the physicians to select the proper drug choice.

Key words: *Drug utilization evaluation, Antimicrobial agents, surgical unit, world health organisation (WHO).*

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INTRODUCTION:

The World Health Organization (WHO) addressed drug utilization as the marketing, distribution, prescription, and use of drugs in a society, considering its consequences, either medical, social, and economic [1]. Studies on the process of drug utilization focus on the factors related to the prescribing, dispensing, administering, and taking of medication, and its associated events, covering the medical and non-medical determinants of drug utilization, the effects of drug utilization, as well as studies of how drug utilization relates to the effects of drug use, beneficial or adverse [2-4].The therapeutic practice is expected to be primarily based on evidence provided by pre marketing clinical trials, but complementary data from post marketing period are needed to provide an adequate basis for improving drug therapy[5].Antimicrobial drugs[6] are the greatest contribution of the 20th century to therapeutics. Drugs in this class differ from all others in that they are designed to inhibit/kill the infecting organism and to have no/minimal effect on the recipient.

The present study was performed to evaluate utilization of antimicrobial agents in surgical units, For our study , we have followed National Treatment Guidelines (NTG) for Antimicrobial Use in Infectious Diseases-2016 and Treatment Guidelines for Antimicrobial Use in Common Syndromes-2017.

MATERIALS AND METHODS:

This is a prospective, observational study to evaluate utilization of drug use & writings patterns of the prescription conducted in Surgical Unit-1 & Surgical Unit-2 in a tertiary care hospital. In the study, a total number of 240 prescriptions were analyzed during the study period which includes 92 male and 148 female patients. The study is planned over a 6months period. Ethical clearance was obtained from the Institutional Ethics Committee before starting the study. Patients of above 15 years and who are admitted in surgical units are involved in it. Treatment charts without AMAs (anti-microbial agents) are excluded from the study. Pregnant women are excluded from this study.

DATA ANALYSIS

Data analysis was carried out using Microsoft excel, Descriptive statistics such as frequencies are calculated for categorical variables. Mean (+/-) Standard Deviation are computerised for continues variables.

RESULTS:

Demographic Profile and Patient Characteristics

In the study, a total number of 240 prescriptions were analyzed during the study period which includes 92 male and 148 female patients. Table 1: Shows prescriptions received from patients in surgical unit I classified as per age from 15-30 30 (25%), 31-45 42 (35%), 46-60 28 (33.60%), 61-70 13 (10.08%),>70 07 (5.83%). Maximum number of prescriptions are 42 from the age group 31-45 years. Minimum of the age group are 07 Prescriptions from more than 70 years. Table 2 Shows prescriptions received from patients in surgical unit II classified as per age from 15-30 26 (21.66%), 31-45 28 (23.3%), 46-60 45 (37.5%), 61-70 14(11.06%), >70 07 (5.83%). Maximum prescriptions were 45 from the age group 46-60 years. Minimum of the age group are 07 Prescriptions from more than 70 years.

Gender variation in both surgical departments

Prescriptions received from patients classified as per gender variation from both the departments of surgical wards-I & II. Males 46 (38.3%), females 74(61.6%) in Surgical ward-I and *Mean* ± *SD* 60 ± 19.79. In Surgical ward-II calculation are males 58(48.3%), females 62(51.6%) and *Mean* ± *SD* 60 ± 2.82.

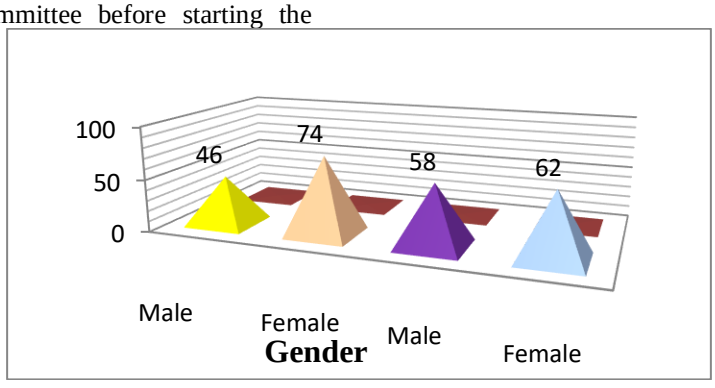

Figure 1: Gender Variation in Both Surgical Departments

Drugs prescribed per day in both surgical wards

Prescriptions are received from patients classified as per drugs prescribed per day from both the departments of surgical wards-I & II. Calculated according to 1-5 days 36 (30.0%), 6-10 days 54 (45.0%), > 11 30 (25.0%) in Surgical wards-I and *Mean* ± *SD* 40 ± 12.49. In Surgical wards-II calculation 1-5 days 43 (35.8%), 6-10 days 47(39.1%), 30 (25.0%) and *Mean* ± *SD* 40 ± 8.8.

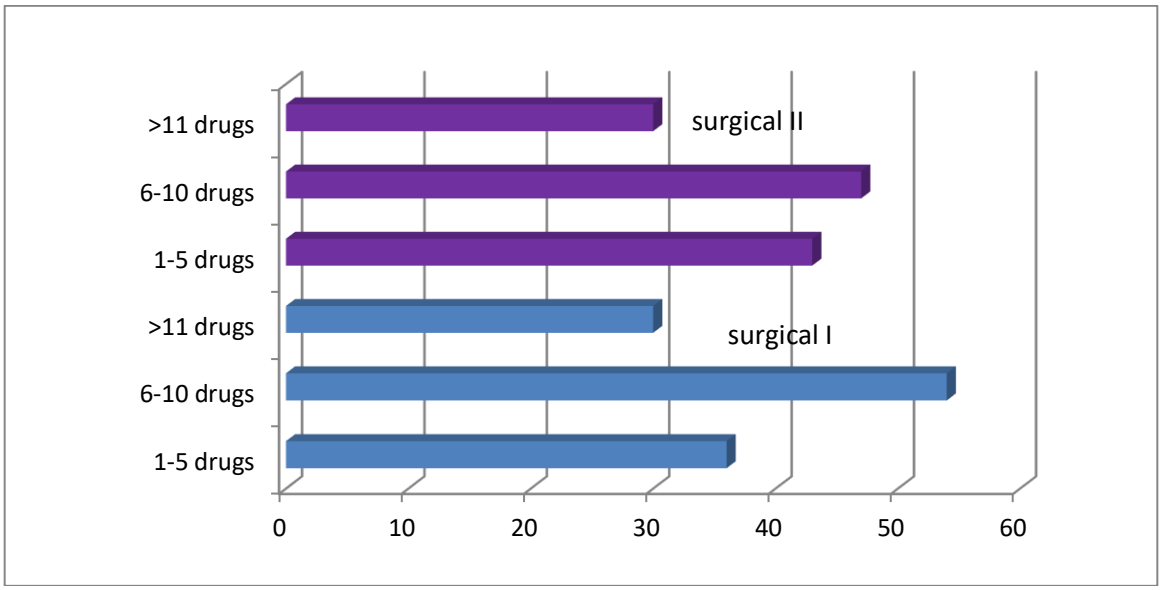

Figure 2: Drugs prescribed per day in both surgical wards

Length of stay of patients in both surgical departments

Length of stay of patient calculated according to 1-5 days 36 (25%), 6-10 days 54 (41.6%), 11- 15 (20.0%),>15(12.5) in Surgical wards-I and *Mean* ± *SD* 30 ± 11.08. In Surgical wards-II calculation 1-5 days 35 (29.1%), 6-10 days 45(39.1%), 11-15 days 25(20.8%),>15 days 20(16.6%) and *Mean* ± *SD* 31 ± 11.08.

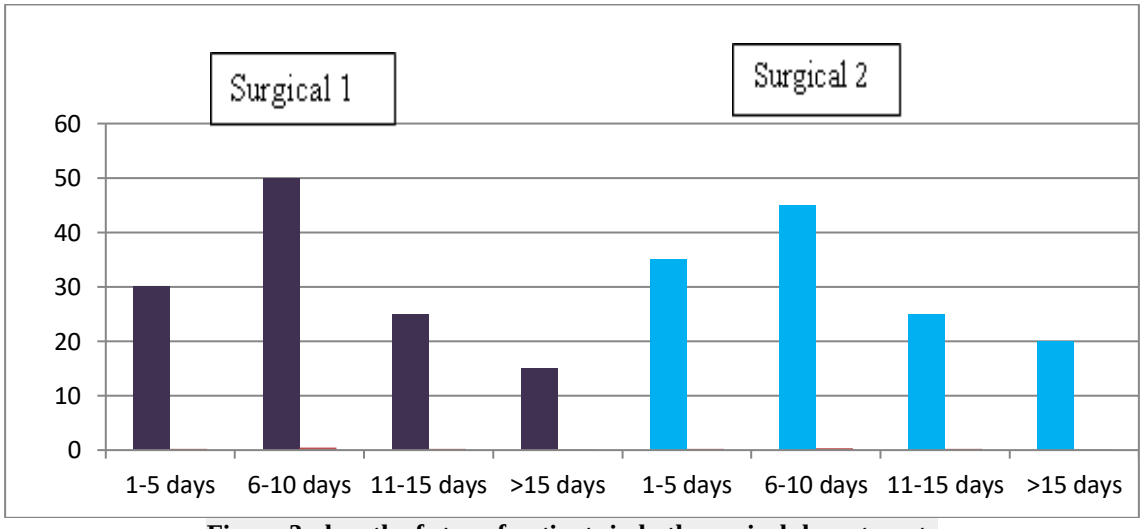

Figure 3: length of stay of patients in both surgical departments

Antimicrobials prescribed in both surgical departments

Antimicrobials prescribed in both surgical departments calculated according to 1-2 drugs 70 (58.3%), 3-4 drugs 40 (33.3%), >5 drugs 10 (8.3%) , in Surgical wards-I and *Mean* ± *SD* 40 ± 30. In Surgical wards-II calculation 1-2 drugs 69 (57.5%), 3-4 drugs 41(34.1%) , >5 drugs 10(8.3%) and *Mean* ± *SD* 40 ± 29.5.

Table 1: Antimicrobials prescribed in both surgical departments

Parameters	Antimicrobials Surgical ward-I	Number	Percentage (%)
Antimicrobial drugs	1-2 drugs	70	58.3%
	3-4 drugs	40	33.3%
	>5 drugs	10	8.3%
	Mean ± SD	40± 30	
Antimicrobial drugs	**Surgical ward-II**		
	1-2 drugs	69	57.5%
	3-4 drugs	41	34.1%
	>5 drugs	10	8.3%
	Mean ± SD	40 ± 29.5	

Most frequently used antimicrobial agents in both surgical departments

The most frequently used antimicrobial agents are Ceftriaxone 50 (12.5%) and Ciprofloxacin 40 (10%) and less frequently used antimicrobial agents are Colistin 03(0.75%) and Azithromycin 05(1.25%).

Table 2: Antimicrobial agents in both surgical departments

Antimicrobial agents	Number of Prescriptions	Percentage (%)
Amoxicillin	20	5%
Metronidazole	35	8.75%
Clindamycin	30	7.5%
Ceftriaxone	50	12.5%
Levofloxacin	25	6.25%
Cefaparazone	28	7%
Ornidazole	12	3%
Cefotaxim	35	8.75%
Amikacin	25	6.25%
Ciprofloxacin	40	10%
Doxycycline	37	9.25%
Streptomycin	20	5%
Linezolid	20	5%
Colistin	03	0.75%
Azithromycin	05	1.25%

Antimicrobial combination in both surgical departments

The most frequently used Antimicrobial combination are Amoxicillin+ clavulanic acid 15 (30%) and cefoperazone+ salbactum 10 (20%) and less frequently used antimicrobial combination are Imipenum +cilastatin 03(6%).

Table 3: Antimicrobial combination in both surgical departments

Parameters	Combination of Antimicrobial agents	Number of prescriptions	Percentage (%)
Antimicrobial agents	Piperacillin + tazobactum	6	12%
	cefoperazone+ salbactum	10	20%
	cefoperazone+ tazobactum	5	10%
	Cefixime+clavulanic acid	4	8%
	Amoxicillin +clavulanic acid	15	30%

Frequency of microorganism isolated from various specimens in both surgical departments

E coli was the most frequently isolated microorganism from various specimens in both the surgical units.

Table 4: Frequency of microorganism isolated from various specimens in both surgical departments

Parameters	Characteristics	Number	Percentage (%)
Microorganisms	E.coli	10	20%
	S.aereus	05	10%
	Citrobacture sps	07	14%
	Enterococcus sps	06	12%

Antibiotic sensitivity pattern of isolated organisms in both surgical departments

Amoxicillin clavulanate was resistant to microorganisms in most of the cases (26.6%)

Table 5: Antibiotic sensitivity pattern of isolated organisms in both surgical departments

Parameters	Characteristics	Number	Percentage (%)
Antimicrobial agents	Amoxicillin clavulanate	08	26.6%
	Ceftriaxone	05	16,6%
	Clindamycin	04	13.3%
	Linezolid	02	6,6%
	Levofloxacin	04	14.3%
	Ciprofloxacin	03	10%
	Metronidazole	02	6.6%
	Cefperazone	02	6.6%

DISCUSSION:

Drug utilization can be defined as the marketing, distribution, prescription, and use of drugs in a society, considering its consequences, medical, social, and economic. The present study was performed to evaluate utilization of antimicrobial agents in surgical units at a tertiary care teaching hospital. During the 6 months period, we collected 240 prescriptions with antimicrobial agents from both surgical I and surgical II units. The data collected were analysed and summarised accordingly.

As comparative study of Bincy Benjamin [7]. The present study was performed to evaluate and improve the use of antimicrobials in critical care patients. During the 6-month study period, we audited 240 prescriptions with antimicrobials from various intensive care units (MICU-110, RICU-99). The data collected were analysed and summarized accordingly.

Victoria J. *et.al* entitled Effectiveness of Education and an Antibiotic-Control Program in a Tertiary Care Hospital in Thailand was published in Clinical Infectious Diseases in the month of March 2006. This article suggests to evaluate the impact of education and an antibiotic-control program on antibiotic-prescribing practices, antibiotic consumption, antimicrobial resistance [8].

Selvaraj R entitled Prospective assessment of

antimicrobial prescribing pattern at a tetiary care hospital was published in US National Library of Medicine enlisted journal in the year of 2015.). This study reveals that most commonly prescribed antimicrobials were beta-lactam antimicrobials (35.09%) followed by fluoroquinolones (18.88%). A combination of antimicrobials from different groups was 13.85% [9].

In MICU, a mean of 10(±4.1) drugs and a mean of 2(±1.0) AMAs were prescribed per patient. The study shows that the prescription of AMAs in MICU was less in comparison to another hospital in North India (3.36%). Similarly, studies from Danish university ICU hospital shows many of their patients were prescribed with only one AMA. In our observation most of the patients received one or two AMAs.

In ICU, the most frequently prescribed AMAs were ceftriaxone followed by amikacin and clindamycin. The AMAs in MICU were found to vary in comparison to other study in India (Data not reported). In the later case, the most commonly prescribed AMAs were cefoperazone, amikacin and metronidazole.

In the surgical I unit, according to the patient demographic details collected, female patients were more. The mean age of the patients was 24 (±14) years and the patients with age group of 31-45 were more (42 patients). The mean length of stay was 30 (± 14) days. The mean drugs prescribed in this unit was 40(±12). More drugs (45%) were given to the patients with the length of stay 6-10 days. The mean antimicrobial agents prescribed in this unit was 40(±30).

In the surgical II unit, the demographic details revealed that the female patients were more. The mean age of the patients was 24 (±14) years and the patients with age group of 46-60 were more (45 patients). The mean length of stay was 31 (±11) days. The mean drugs prescribed in this unit was 40 (± 8). More drugs were given to the patients with the length of stay 6-10 days. The mean antimicrobial agents prescribed in this unit was 40 (±29.)

In our study, Majority of cases are from both surgical I and surgical II units, a total of 16 AMA monotherapies and 7 AMA combination therapies were prescribed. Among them the most frequently used antimicrobial monotherapy agents were ceftriaxone and ciprofloxacin. The least frequently used antibiotic was colistin. The most frequently used antimicrobial combinations were amoxicillin + clavulanic acid and cefoperazone+ salbactum. The least used combination was Imipenum +cilastatin. chealth system policy makers should consider implementing reasonable administration guidelines for AMAs through appropriate drug policies. In future, pharmacists have a greater responsibility to take prominent roles in antimicrobial stewardship and infection prevention and control programs in healthcare systems.

CONCLUSION:

The drug utilization studies provided by clinical pharmacists at the hospital was found to be useful and beneficial to the health care professionals. We concluded that Study on organisms prevailing and its sensitivity pattern of AMAs in the Surgical department units will help the physicians to select the proper drug of choice. Over all, the antimicrobial agents were prescribed rationally. The development and regular updating of antimicrobial use guidelines and restriction policies could be useful in promoting better patient care. Clinical pharmacists and physicians must play a crucial role in minimizing the problems associated with irrational use of antimicrobial agents by conducting awareness programs among other healthcare professionals. The clinician may consider initiating the therapy based on antibiogram. Also, the dose adjustment in patient may be done based on further results of culture sensitivity tests.

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CONFLICT OF INTEREST

The authors declared no conflict of interest

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