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Drug Utilization Study of Antimicrobial Agents in the Indoor Patient of the Medicine Department in a Tertiary Care Hospital - A Prospective Observational Study

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Abstract: ***Background: In developing countries irrational use of antimicrobials agents in the healthcare system has been observed, thus this study was conducted to assess the prescribing patterns of antimicrobial agents in general medicine wards of a tertiary health care center in Central India. Materials and Methods: A prospective observational study was conducted over a period of 18 months. Standard proforma was used to collect information regarding socio - demographic factors, route, dose, indications of antimicrobial agents. Data was analyzed with help of Microsoft excel 2010 and expressed as percentage. Results: Total 900 cases were studied. Majority of the patients 319 (35.44%) belonged to 21 - 40 years age group of which 538 (59.77%) were males. Most of the patients 561 (62.33%) were from Urban areas. Most antimicrobial agents were administered Intravenously (1644, 91.44%). Most commonly prescribed anti - microbial agent was Ceftriaxone 539 (29.97%) followed by Piperacillin - Tazobactam 230 (12.79%), Amoxiclav 198 (11.01%), Artesunate 203 (11.29%),, Metronidazole 195 (10.84%). Most of the antimicrobial agents 1557 (86.59%) were prescribed by brand names. The antimicrobial agents prescribed as monotherapy were 224 (12.45%) and as FDCs were 455 (25.30%). Majority of the patients 526 (58.44%) were prescribed two antimicrobial agents. Out of the total number of antimicrobials prescribed 80.92% were from the Essential Medicine List. Conclusion: A variety of antimicrobials were utilized from various antimicrobial classes. The number of antimicrobials prescribed by generic names was low. An effort must be made to encourage prescribing by generic names. Rational use of antimicrobial agents should be encouraged by following strict Hospital antimicrobial policy. Polypharmacy was noted which may be related to drug - drug interactions and adverse drug reactions. So, polypharmacy should be discouraged.***

Keywords: Antimicrobials, Generic, Essential Medicines, Polypharmacy

1. Introduction

Drug utilization study helps to assess appropriateness of pharmacotherapy with important implications for day - to - day clinical practice. It also helps to identify the areas which need to be changed for improvement [1]. Many drugs utilization studies has been done before and shown considerable variations when there is failure to control the symptoms of the patients or disease it ultimately leads to polypharmacy while writing a prescription.

While writing the prescriptions of Antimicrobial Agents, a clinician should try to define the type of infection and presumably causative microorganism. The points which should be kept in mind while prescribing antimicrobial agents, effectiveness of antimicrobial agents, other effective alternatives, less toxic alternatives, less expensive and with narrower spectrum. So, drug utilization study is helpful in detecting problems before a prescription is dispensed [2].

In developing countries and throughout the world ineffective, inappropriate, and non - economic use of drugs in the healthcare system has been observed [3]. In Hospital's setup antimicrobial agents are commonly prescribed drugs and the successful use of antibiotics has brought revolutionary change in controlling infectious disease. This also landed into misuse or overuse of antimicrobial agents. [4]

A survey has been conducted and shown that approximately 20% - 65% of the prescribed antimicrobial agents are either incorrect or inappropriate [5] [6]. Many authors have expressed their concerns about the unnecessary, excessive use of antimicrobial agents and continuous indiscriminate use which promotes the antimicrobial agents resistance in patients. The recommended strategies like knowledge of prescription and habits and close monitoring of antimicrobial use are helpful in hospitalized patients. [7] [8]

2. Materials and Methods

The study was initiated after getting written approval from the institutional ethics committee.

Written, informed, and valid consent was taken from the patients included in the study.

Details of the indoor patients in the medicine department of tertiary care teaching hospital were reviewed and retrieved after obtaining clearance from the ethics committee.

The data were collected in predesigned format.

Study Design: It was prospective observational study.

Study Setting: General medicine wards.

Study population: Patient admitted in general medicine ward of age group 13 - 65 years.

Sample size: 900

Sampling technique: systematic random sampling

Study period: 18 months for data collection and analysis.

***Data analysis plan*:** The data were collected in the predesigned case record form and was analyzed in Microsoft excel 2010 and expressed as a percentage.

Selection Pattern of Patients:

Inclusion criteria

- After written informed consent of the patient
- IPD patients with prescribed antimicrobial agents
- Patients of both sex with age group of 13 - 65 years

Exclusion criteria

- Nonconsenting patients
- Case record with no antimicrobial agents prescription
- Patients who have taken DAMA discharge
- Patient who has been shifted to ICU.

3. Results

Among the 900 case record forms examined, most of the patients admitted in general medicine ward were from age group 21 - 40 years319 (35.44%) followed by 41 - 60 years 306 (34.00%) and the mean age of patients was 39.30 years+ 16.36

Table 1: Age range of patients admitted. (n=900)

Age range	Number of patients	Percentage of patients
13 - 20 yrs.	159	17.66%
21 - 40 yrs.	319	35.44%
41 - 60 yrs.	306	34.00%
61 – 65	116	12.88%
Total	900	
Mean+S. D	39.30 + 16.36	

Among 900 patients studied most common were males 538 (59.77%) followed by female patients362 (40.22%).

Table 2: Distribution of Male and female among the 900 patients

Sr. no	Gender	Number	Percentage
1	Male	538	59.77%
2	Female	362	40.22%
	Total	900	

Out of the 900 case record forms which were analyzed, 561 (62.33%) of the patients were from Urban areas, while just 339 (37.66%) came from rural areas.

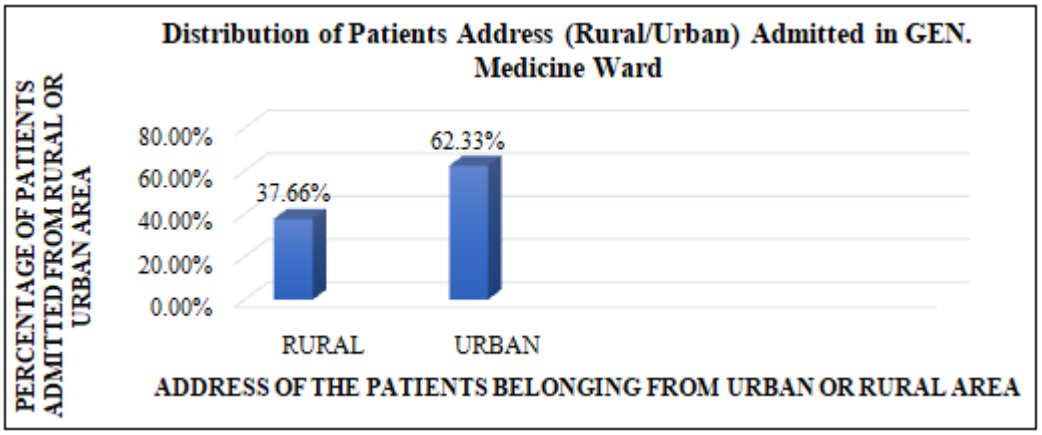

Figure 1: Distribution of patients rural/urban

The most common route of administration of antimicrobial agents was Intravenous route1644 (91.44%) followed by oral route154 (8.56%).

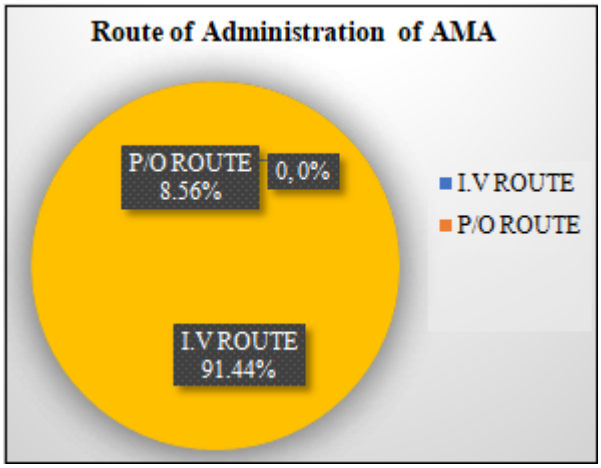

Figure 2: Route of administration of antimicrobial agents

There were 1798 antimicrobial agents prescribed in total across 900 case record forms. The most commonly prescribed Anti - microbial agent was Ceftriaxone 539 (29.97%) followed by Amoxiclav 198 (11.01%), Artesunate 203 (11.29%), Piperacillin - Tazobactam 230 (12.79%), Metronidazole 195 (10.84%), Acyclovir 30 (1.66%), Fluconazole 58 (3.22%), Ciprofloxacin 175 (9.73%), Doxycycline 23 (1.27%), Cotrimoxazole 27 (1.50%), Azithromycin 63 (3.50%), Norfloxacin 16 (0.88 %) and Rifaximin 41 (2.28%)

Table 3: Distribution of AMA prescribed via intravenous and oral route

S. No.	Drugs prescribed in the IPD	Number	Percentage
1	Ceftrixone	539	29.97%
2	Amox - clav	198	11.01%
3	Artesunate	203	11.29%
4	Piperacillin - tazobactam	230	12.79%
5	Metronidazole	195	10.84%
6	Acyclovir	30	1.66%
7	Flucanazole	58	3.22%
8	Ciprofloxacin	175	9.73%
9	Doxycyclin	23	1.27%
10	Cotrimoxazole	27	1.50%
11	Azithromycin	63	3.50%
12	Norfloxacin	16	0.88 %
13	Rifaximin	41	2.28%
	Total	1798	

Table 4: Showing the WHO prescribing indicators

S. No.	WHO Prescribing indicators	Percentage
1	Average number of antimicrobial agents Per prescription	1.99
2	Percentage of antimicrobial agents Prescribed by generic names	13.40%
3	Percentage of antimicrobial drugs Prescribed by brand names	86.59%
4	Percentage of antimicrobial agents Prescribed from essential medicine list	80.92%
5	Percentage of encounters with injectables	90.54%

Out of the total 1798 antimicrobial agents prescribed in the 900 cases 1455 (80.92%) were from the essential medicine list, whereas 343 (19.07%) were not from the essential medicine list.

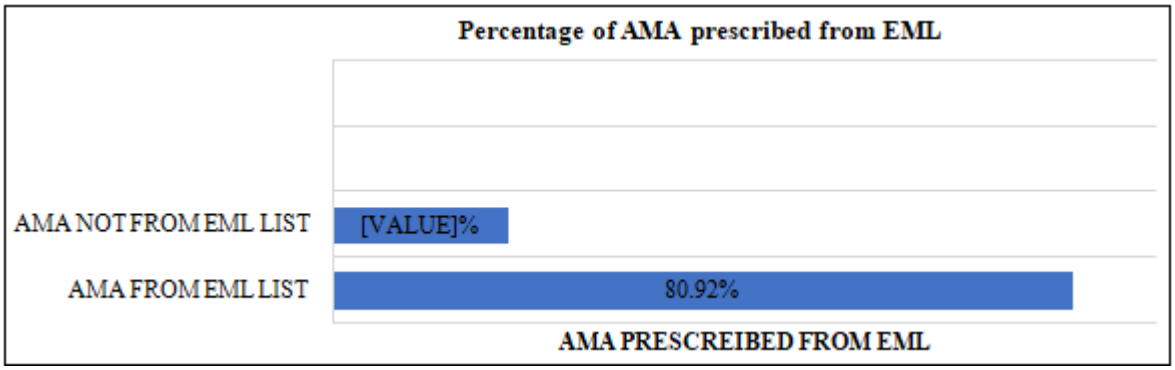

Figure 3: Percentage of antimicrobial agents prescribed from essential medicine list

Out of 1798 antimicrobial agents prescribed, total 241 (13.40%) of antimicrobial agents were prescribed in generic name and 1557 (86.59%) of antimicrobial agents were prescribed by brand name.

Table 5: Percentage of antimicrobial agents prescribed in brand name and generic name

S. No.		Number	Percentage
1	Antibacterial Drugs Prescribed in Generic Name	241	13.40%
2	Antibacterial Drugs Prescribed in BR and Name	1557	86.59%
	Total	1798	

The number of antimicrobial agents prescribed as monotherapy were 224 (12.45%), while fixed dose combinations were 455 (25.30%).

Table 6: Antimicrobial agents prescribed in FDC and Monotherapy

S. No.		Number	Percentage
1	Antimicrobial Agents Prescribed INFDC	455	25.30%
2	Antimicrobial agents prescribed in monotherapy	224	12.45%

Prescriptions containing one antimicrobial agent are 224 (24.88%), prescriptions containing two antimicrobial agents are 526 (58.44%), prescriptions containing three antimicrobial agents are 98 (10.88%) and prescription containing 4 and above antimicrobial agents are 52 (12.68%) of the total 900 examined case record forms.

Table 7: Number of antimicrobial agents prescribed per prescription

S no.	Categories	No. of patients/ prescription Out of (900)	Percentage of patients	Percentage of AMA out of total (1798) AMA
1	Single antimicrobial therapy	224	24.88%	12.45%
2	Double antimicrobial therapy	526	58.44%	58.50%
3	Triple antimicrobial therapy	98	10.88%	16.35%
4	4 and above antimicrobial therapy	52	5.77%	12.68%
	total	900		

4. Discussion

Drug utilization studies provide insight into the doctor's mindset regarding diseases and the use of various drugs in treatment.
The current study was carried out to determine the drug utilization pattern of antimicrobial agents in the general medicine ward.

A prospective observational study was conducted, and 900 case record forms containing the patient's initials, age, gender, address, IPD registration number, diagnosis, antimicrobial drug prescribed information (including name, dose, route, frequency, and duration per prescription, number of antimicrobial drugs prescribed, number of antimicrobial drugs prescribed in monotherapy, fixed dose combination, and brand name) were collected.

According to the current study, patients between the age group of 21 and 40 years are 319 (35.44%) more prevalent, which is similar to previous research done by Meena VK et al [9].

This may be because a large portion of the population in this age range is young, from an autonomous occupational group and they are exposed to environmental factors also.

In the current study men are more frequently admitted in the general medicine than the female which is similar to the study of Meena vk et al, [9], Lenka RK et al [10] and it is closely related to study done by ashish Pathak et al. [11] and akramahemad et al. [12]

This may be due to less exposure of female population to environmental factors which influences to get more infectious disease as compared to male population.

The patients who were admitted in general medicine ward were mostly from the urban areas, as compared to rural areas which is lower than the study done by Rangdal K, [13]

This could be attributed to increased health awareness and more conveniently accessible health care facilities because of transportation advantages while the rural population is still facing transportation problems in some areas. The health care system at rural areas is also improving by government via PHCs. This might be the one reason for the less rural (population) hospitalization rate.

In the current study, most of antimicrobial agents are administered via intravenous route, similarly, to result obtained from a study done by Paul S et al [14]

It is due to the fact that those patients who are hospitalized/admitted the preferable route of administration of drug is intravenous, patients are mostly critically ill is also the reason for selecting intravenous route.

According to the current study results, the most commonly prescribed antimicrobial agent is Ceftriaxone and least prescribed antimicrobial agent is norfloxacin, which similar to study conducted by anulakshmi S et al [15], Meena vk et al [9], Meherbr et al [16].

In the current study, a single antimicrobial agent was administered in 24.88% of cases, followed by two antimicrobial agents in 58.44% of cases and prescriptions containing more than two antimicrobial agents were 150 (16.66%) of total patients. This is comparable to the findings by, Lenka RK et al [10]

It is advisable to use fewer antimicrobial agents because there is a lower risk of resistance development and adverse effects.
The most often utilized fixed dose combination in the current study was piperacillin tazobactam 230 (12.79%) followed by amoxicillin clavulanic acid198 (11.01%) and cotrimoxazole 27 (1.50%). Which is similar to study result of anulakshmi S et al. [15]

In the current study predominance of brand name is seen as compared to generic name, this is similar to the results from study conducted by Rangdal K et al, [13] and Lenka RK et al. [10]. Total antimicrobial agents prescribed in this study is above the study results conducted by, Meherbr et al[16].

The reason for not prescribing drugs under their generic names is owing to tradition, marketing of medications under their brand names, and pharmaceutical corporations' deceptive drug promotion practices. [17] [18]

The majority of the medications prescribed in this study were from the essential medicine list, which is similar to a previous study done by Rangdal K, et al. [13]

In the present study the average number of antimicrobial agents perprescriptionwas1.99, whichissimilar to other studies conducted by Meherbr et al [16] and lower than the study conducted by Nila ss et al [19]

5. Conclusion

Many improvements were noted in the current study, such as most antimicrobial agents being prescribed from the essential medicine list, free government supply and were prescribed in appropriate doses.

This study also found that brand - name prescriptions was dominated which should be discouraged and prescription by generic name should be encouraged. Polypharmacy was noted which may be related to drug - drug interactions and adverse drug reactions. So polypharmacy should be discouraged.

Antimicrobial agents prescribed per individual should be properly analyzed to aid in the avoidance of antimicrobial resistance and increasing treatment costs.

More such studies with a higher number of patients and additional departments are required.

6. Limitations

- After being discharged from the ward, patients were not in follow up.
- Because the study was restricted to indoor medicine patients only, it was unable to evaluate institutional

patterns generally.

- The adverse drug reaction of any prescribed antimicrobial agents is not taken into account in this study.
- Other medicines prescribed along with antimicrobial agents were not taken into consideration in this study and could have also caused interactions and adverse effects.

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Conflict of interest: Nil

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