International Journal of Basic & Clinical Pharmacology
Ramesh et al. Int J Basic Clin Pharmacol. 2023 Nov;12(6):842-846
http://www.ijbcp.com
pISSN 2319-2003 | eISSN 2279-0780

DOI: https://dx.doi.org/10.18203/2319-2003.ijbcp20233196

Original Research Article

Prescription pattern of antibiotics in various clinical departments of a tertiary care health institution: a retrospective observational study

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Received: 02 September 2023
Revised: 04 October 2023
Accepted: 05 October 2023

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ABSTRACT

Background: Antimicrobial resistance has been considered as one of the greatest challenges to the general public health today. The Antibiotic Stewardship Program has emphasized on prevention of drug resistant bacterial infection, targeted therapy against susceptible or resistant microorganism and to curtail unnecessary and irrational use of antibiotics. Present study aimed to evaluate the pattern of antibiotic prescription amongst the hospitalized patients of IGMC Shimla in Himachal Pradesh.
Methods: It was a retrospective observational study. Data was collected from hospital records of admitted patients in medicine and Surgical wards. Patient data like demographic profile, average hospital stay and number of antibiotics prescribed were extracted from their hospital records. Also, the data about oral/parenteral, generic/branded empirical/definitive and therapeutic/prophylaxis prescription in each patient were collected.
Results: In medicine ward, the number of generic prescriptions 78 (71.5%) were more as compared to branded 31 (28.5%) and majority were given the parenteral 61 (55.9%) than the oral 48 (44.1%) dosage form. In surgery ward, the branded prescriptions 61 (91%) out-numbered the generic prescription 6 (9%). The route of administration was mostly oral; 56 (83.5%), while only few had parenteral prescription; 11 (16.5%) in this ward.
Conclusions: It was found that majority of patients in medicine ward received generic named antibiotics for definitive management, while in surgical ward branded named antibiotics were prescribed for surgical prophylaxis. The cephalosporin was the most commonly prescribed antibiotic group. Majority of antibiotics belonged to "watch" category as far as WHO's AWaRe classification is concerned.

Key words: Antibiotic resistance, Antimicrobial stewardship program, AWaRe

INTRODUCTION

Antibiotics are one of the most commonly prescribed drugs globally.[1,2] However inadvertent, unethical and injudicious use of antimicrobial agents resulted in development of multi-resistant microorganism, which pose a serious threat to the effective management of various infectious diseases. Antimicrobial resistance has been considered as one of the greatest challenges to the general public health today.[2] Since long, the Centers for Disease Control and Prevention (CDC) is working immensely to improve the pattern of antibiotic prescription. It recommends the institution of an Antibiotic Stewardship Program (ASP) in all health institution.[3] The ASP has emphasized on prevention of drug resistant bacterial infection, targeted therapy against susceptible or resistant microorganism and to curtail unnecessary and irrational use of antibiotics. Recently Access, Watch and Reserve (AWaRe) classification of antibiotics initiated by

WHO has assisted the ASP in optimizing the usage of antibiotics. It is a WHO tool, where antibiotics are classified into different groups to emphasize their importance in appropriate usage. Thus, the knowledge and implementation of effective ASP in health care institution has been given an utmost importance as far as accepting the challenge of antimicrobial resistant containment is concerned. Present study aimed to evaluate the pattern of antibiotic prescription to know the most common antibiotic being prescribed, trend of culture sensitivity testing, number of antibiotics in one particular patient amongst the hospitalized patients of IGMC Shimla in Himachal Pradesh. It may contribute in making policies for better antibiotic utilization in the institution, apart from its vital role in curtailing the development of antimicrobial resistance and thereto prescription of rationale and cost-effective antibiotic in a low resourceful state of Himachal Pradesh.

METHODS

This study was conducted in a tertiary care hospital, Indira Gandhi Medical College Shimla, Himachal Pradesh. The IGMC Shimla provides a premier health care facility to the hilly state of Himachal Pradesh, comprising of all the major health care specialties. We planned a retrospective observational study and collected the data from hospital records of the patients admitted in medicine and Surgical wards during six months period; from 1August 2022 to 31 January 2023. A total of 140 patient's data (70 from Medicine and Surgery ward each) were collected and analyzed. Patients on long term antimicrobial therapy like antitubercular, antiretroviral and anticancer were excluded rom the study. All patients were strictly followed from the day of their admission till the date of discharge. Patient data like demographic profile, average hospital stay and number of antibiotics prescribed were extracted from their hospital records. Also, the data about oral/parenteral, generic/branded empirical/definitive and therapeutic/prophylaxis prescription in each patient were collected. Data regarding availability of antibiotic within hospital stock was also noted. Before initiation of antibiotic, whether culture sensitivity preformed or not, was also noted. All prescribed antibiotics were classified as per the WHO "AWARE" classification. Data was entered into Microsoft Excel. Data was analysed using statistical software Epi Info version 7.2.5.0. The categorical variables and continuous variables reported as percentages and mean ± standard deviation respectively.

RESULTS

A total of 140 patients, 70 from each medicine and surgery ward were enrolled in our study. The average hospital stay in medicine ward was 6.4 days, while it was 3.5 days in surgery ward. Amongst 70 enrolled patients in medicine ward, only 45 were prescribed antibiotics. A total of 109 antibiotics were prescribed for these 45 patients, thus the average number of antibiotics per patient was 2.42 in this ward. However, a total of 63 patients were given 67 antibiotics in surgery ward.

Table 1: General data of indoor patients enrolled in the study.

Variables	Medicine (N=70)	Surgery (N=70)
Average hospital stays (days)	6.4	3.5
No. of patients on antibiotics, N (%)	45 (64.3)	63 (90)
Total number of antibiotics prescribed	109	67
Average number of antibiotics per patient	2.42	1.06

Table 2: Description of antibiotic prescription.

Variables		Medicine (N=109) Frequency (%)	Surgery (N=67) Frequency (%)
Type	Generic	78 (71.5)	6 (9)
	Branded	31 (28.5)	61(91)
Route	Oral	48 (44.1)	56 (83.5)
	Parenteral	61 (55.9)	11 (16.5)
Therapy	Empirical	94 (86.2)	60 (90)
	Definitive	15 (13.8)	7 (10)
Purpose	Therapeutic	100 (91.7)	17 (25.3)
	Prophylaxis	9 (8.3)	50 (74.7)
Source	Hospital	70 (64.2)	15 (22.4)
	Purchased	39 (35.8)	52 (77.6)
Test	Culture sensitivity	15 (13.8)	7 (10)

Thus, the average number of antibiotics being prescribed in surgery ward was 1.06 (Table 1). In medicine ward, the number of generic prescriptions 78 (71.5%) were more as compared to branded 31 (28.5%) and majority were given the parenteral 61 (55.9%) than the oral 48 (44.1%) dosage form. It was observed that 94 (86.2%) prescriptions in medicine ward were empirical while only 15 (13.8%) were definitive. Amongst these prescriptions 100 (91.7%) were for therapeutic purpose while, 9 (8.3%) were given as prophylaxis. Further, 70 (64.2%) prescriptions were available in the hospital supply, 39 (35.8%) had to purchase their medicines in the medicine ward (Table 2).

In surgery ward, the branded prescriptions 61 (91%) out-numbered the generic prescription 6 (9%). The route of administration was mostly oral; 56 (83.5%), while only few had parenteral prescription; 11 (16.5%) in this ward. Number of empirical and definitive prescription in this ward was 60 (90%) and 7 (10%) respectively. The majority of prescription in surgical ward were for prophylaxis 50 (74.7%) rather than therapeutic 17 (25.3%). It was seen that 52 (77.6%) prescriptions had to be purchased from

outside, while only 15 (22.4%) prescriptions were available in the hospital supply (Table 2).

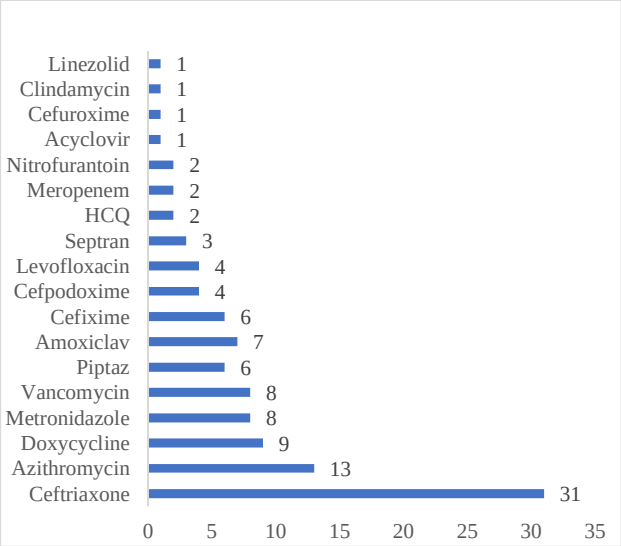

Figure 1: Frequency of indivisual antibiotics used in medicine ward (N=109).

In medicine ward, most of the patients 44 (40.3%) patients were given antibiotics for 7 days or more than 7 days, while majority of patients in surgical ward 60 (89.5%) had antibiotics for 5 to 7 days (Table 3).

Table 3: Duration of antibiotic prescription.

No. of days patient on antibiotic	No. of antibiotics (%)	
	Medicine (N=109)	Surgery (N=67)
Less than 3	10 (9.2)	0 (0)
3 to <5	32 (29.3)	1 (1.4)
5 to <7	23 (21.1)	60 (89.5)
7 to >7	44 (40.3)	6 (8.9)

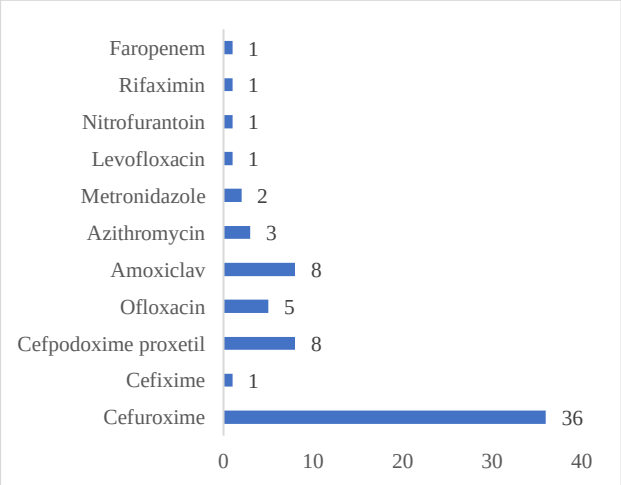

Figure 2: Frequency of indivisual antibiotics used in surgery ward (N=67).

Table 3: Duration of antibiotic prescription.

No. of days patient on antibiotic	No. of antibiotics (%)	
	Medicine (N=109)	Surgery (N=67)
Less than 3	10 (9.2)	0 (0)
3 to <5	32 (29.3)	1 (1.4)
5 to <7	23 (21.1)	60 (89.5)
7 to >7	44 (40.3)	6 (8.9)

The most common antibiotic being prescribed in medicine ward was Ceftriaxone 31 (28.4%), followed by Azithromycin 13 (11.9%) and Doxycycline 9 (8.2%) (Figure 1). However, in surgical ward it was Cefuroxime 36 (53.7%) followed by Cefpodoxime 8 (11.9&) and Amoxiclav 8 (11.9%) (Figure 2). When we categorize the prescribed antibiotics as per the WHO's AWARE classification, it was found that 69 (63.3%) antibiotics in medicine and 57 (85.1%) in surgery ward belong to "watch" category. Similarly, 33 (30.3%) antibiotics in medicine and 9 (13.5%) in surgery ward belong to "access", while percentage of antibiotics belonging to reserve category were as 1 (0.9%) in medicine and 1 (1.4%) in surgery ward (Figure 3).

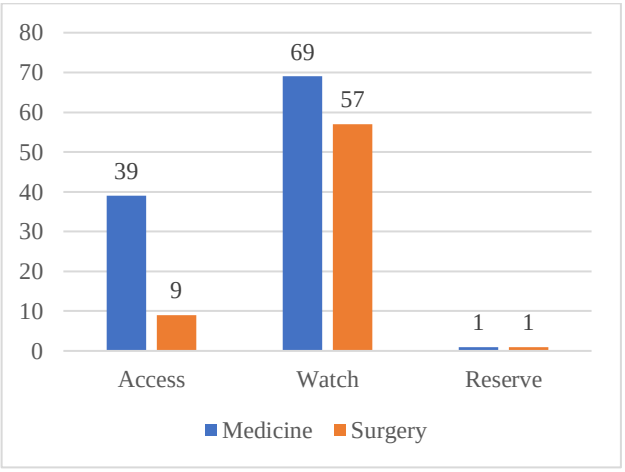

Figure 3: AWARE classification of antibiotics as per WHO.

DISCUSSION

Irrational drug prescription poses a serious threat to the public health world wide. Understanding the concept of rational use of medicine and evidence based medicine is a key to curtail the development of antibiotic resistance in present scenario. WHO has given various indicators like prescribers indicator, patient care indicator and health care facility indicator to evaluate the process of drug utilization. According to the WHO, more than 50 % of all medicines are prescribed, dispensed or sold inappropriately.[4] In our present study, out of 70 indoor patients in medical ward, 45 (64.3%) patients were under antibiotic coverage. Majority of them had therapeutic indication and only a few had prophylactic indication in this ward. However, amongst 70 surgical ward indoor patients, 63 (90%) had

been prescribed the antimicrobials and most of these prescriptions were prophylactic rather than therapeutic, which is contrary to what we observed in medical ward. The percentage of antibiotic prescription was high in surgery ward as compared to the medicine ward as most of the patients in this ward were on post-surgical antibiotic prophylaxis to prevent the surgical site infection. However, a similar study conducted by Yohannes et al documented a prophylactic usage of antibiotic in 69 % hospitalized patients.[5] Similar study conducted in Pakistan by Atif M, et all, observed the percentage of antibiotic prescription in 55.5% patients.[6] Another study conducted in China observed 54.6% patients under antibiotic coverage.[7] Thus, the overall percentage of antibiotic prescription in all these studies was higher than the WHO recommendation of (20%-26.8%).

The quality of prescription can be assessed by observing the percentage of generic prescription. As per WHO, it should be the generic one. In our study, 78 (71.5%) antibiotic prescription in medicine ward were generic, while the percentage of generic prescription in surgical ward 6 (9%) was far behind. The difference in generic prescription among the two wards can be attributed due to the fact that most of the patients in medicine ward had therapeutic antibiotic prescriptions, these drugs were available in the hospital store for indoor usage while, in surgical ward, the antibiotics were prescribed prophylactically at the time of discharge to prevent surgical site infection. It is evident that at the time of discharge, most of patients had to procure their medicines from medical shops. Our present study data of medicine ward was comparable with the similar studies conducted on pattern of prescription by Prabhakar Singh et all in Rewa, Madhya Pradesh, India, which documented 96.88% generic prescription used in their study participants.[8] Another similar study in Euthopia had observed 85.78% generic prescriptions.[9] In our study, 61 (55.9%) patients in medicine ward and 11 (16.5%) patients in surgery ward had been prescribed the injectable antibiotics. Lesser percentage of injectables in surgical ward can be due to the fact that majority of surgical ward patients took antibiotic at the time of discharge, thus most of them had oral prescription 56 (83.5%). However, in medicine ward 48 (44.1%) had oral antibiotic prescriptions. Similarly higher rate of injectable prescription (84.8%) was seen in a study conducted by Demoz et al.[10] Various other studies had found the rate of injectable prescription as 26.5%[11] and 38%.[12]

Majority of patients 44 (40.3%), in medicine ward had antibiotic prescription for 7 days or more, whereas in surgical ward, 60 (89.5%) patients had antibiotic duration between 5 to 7 days (Table 3). Thus, the duration of antibiotic prescription in surgical ward was comparable, but was higher than the "Optimal antimicrobial duration for common bacterial infections" given by Australian prescriber.[13] Either shorter or longer duration of antibiotic prescription warrants the need for antibiotic policy in any institution. The most commonly used antibiotic in medicine ward was Ceftriaxone 31 (28.4%), followed by Azithromycin 13 (11.9%) and Doxycycline 9 (8.5%). In surgical ward it was Cefuroxime 36 (53.7%) followed by Cefpodoxime 8 (11.9%) and Amoxiclav 8 (11.9%). Thus, our study highlighted the exorbitant usage of broad spectrum-third generation cephalosporins ahead of the culture and sensitivity report, which again warrants the need for legitimate antibiotic policy in the institution. We have categorized all the antibiotics as per the WHO's AWARE classification. In our study majority of antibiotics (63.3% in medicine ward and 85.1% in surgical ward) belong to "Watch" category. In a similar study conducted by Salam Abu-Ajaleh, et all it was found that around 70% of the prescribed antibiotics in the pre-interventional stage belonged to the Watch category and 23.1% belonged to the Reserve category while, only 7.6% belonged to the Access category.[14] It is contrary to The WHO 2021 AWaRe classification, which targets 60% of total antibiotic consumption being "Access" group antibiotics.[15] Antibiotics in "watch" group have more toxicity and chances of resistance development are more in this group, while antibiotics in "access" group are first line or second line antibiotics, readily available and are relatively safe. The reserve group antibiotics should be used for specific indications only. Aim of ASP should be to enhance the consumption of more access group or limit the usage of watch group so as to promote the rational use and to prevent the development of resistance among various antimicrobial usage.[16,17]

Limitations

Current study has some limitations like it was conducted in two departments of a single hospital. Therefore, the observations cannot be generalized. Sample size was small. We emphasize such study with large sample size at multiple institutions.

CONCLUSION

Antibiotics remain one of the most commonly prescribed drugs globally. However, because of unethical, irrational and injudicious usage of antibiotics and also due to the rapid development of antibiotic resistance, the effective management of various infectious diseases have been jeopardized now. We aimed to find out the pattern of antibiotic prescription in our institution. It was found that majority of patients in medicine ward received generic named antibiotics for definitive management, while in surgical ward branded named antibiotics were prescribed for surgical prophylaxis. The cephalosporin was the most commonly prescribed antibiotic group. Majority of antibiotics belonged to "watch" category as far as WHO's AWaRe classification is concerned. Though our study had its own limitation as sample size was less and indication of antibiotic prescription was totally different in two different wards of the hospital. Antibiotic stewardship program and classification of antibiotics as per WHO's AWaRe can rationalize the prescription and help in decreasing the rapid development of antibiotic resistance in an institution.

Thus, it is recommended that every hospital should have its antibiotic policy. It may contribute in better antibiotic utilization in the institution.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Ramesh*, Vadhwa M, Ridhima. Prescription pattern of antibiotics in various clinical departments of a tertiary care health institution: a retrospective observational study. Int J Basic Clin Pharmacol 2023;12:842-6.