ORIGINAL ARTICLE

Prescribing Pattern of Antibiotics Utilization in Surgery, Pediatric, and General Medicine Wards in a Tertiary Care Hospital, Bengaluru, India

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Abstract

Objective: To prescription pattern of antibiotic drugs in different medical facilities such as general medicine, surgery, and pediatrics, in a tertiary care hospital and evaluate the antibiotics utilization pattern and check the adherence to the antibiotic policy to explore reasons for the non-adherence. **Materials and Methods:** A total of 300 inpatients were included in this study. Prescriptions and treatment chart of inpatients were reviewed prospectively for prescribed patterns of proton pump antibiotics. The inpatient case sheets and prescriptions will be screened for analysis of prescriptions for various effects of antibiotics on a daily basis. All the prescribed medications along with other medications and relevant information will be noted in a customized data collection form to find out the antibiotics utilization. The antibiotic prescription will be assessed whether it is according to hospital antibiotic policy and in case of violation, the reason for it will be noted down. The incidence and cause for the nosocomial infection will be noted down. The incidence and cause for the nosocomial infection were noted down. **Results:** In our study, it is found that out of 300 patients 60.5% were male and 39.5% were females, and thus the average number of drugs per patient was 7. Among studied patients, 3.67% were using 1–3 medication followed by 27.14% of patients using 4–6 medications. According to extensive (70%) antibiotics were observed in the study population. In our study, patients suffering from GIT ailments, appendicitis, pancreas, pulmonary, central nervous system, cardiovascular system, bone, liver genitourinary problems, fever, and suffering from dengue. In our study, various class of antibiotics such as penicillin's, macrolides, cephalosporin's, and fluoroquinolones were prescribed. There were various combination drugs prescribed which are specific to the disease out of which ampicillin+gentamicin+metronidazole (5%) and ampicillin + gentamicin + cefotaxime + aminoglycoside (5%). **Conclusion:** Most common antibiotic used was ceftriaxone, more than one antibiotic was prescribed, and only 11% of antibiotics were prescribed in the generic name. Most common antibiotic used was ceftriaxone. Number of antibiotics prescribed per prescription was 1.83. Antibiotics was mostly prescribed by brand name. The concluded the adherence to hospital policy in prescribing antibiotics was largely seen. In appropriate use of antibiotics is detected due to lack of culture sensitivity test which has to make mandatory in the hospital before antibiotic prescription. In our study, Polypharmacy was seen in a large extent were patients were put on 4–5 antibiotics ,which also has to be avoided by using broad spectrum antibiotics and fixed dose antibiotics suitably.

Key words: Antibiotics utilization, hospital policy, pediatric and general medicine wards, prescription pattern, surgery

INTRODUCTION

The most commonly prescribed drugs among pediatrics are antibiotics. Resistance developed due to the irrational,[13,8] the use of antibiotics is a global public health problem.[15] Children have high rates of minor infection, and due to their increased susceptibility to serious bacterial infection, they are frequently prescribed with

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Table 1: List of drugs prescribed other than antibiotics in our study population

Drugs	Male (%)	Female (%)	Total (%)
Antihypertensive	7 (1.5)	5 (1.1)	12 (6)
Antianginal	2 (0.4)	1 (0.2)	3 (1.5)
Antihistamines	0.0	3 (0.7)	3 (1.5)
Hypolipidemic	6 (1.3)	2 (0.4)	8 (4)
Nasal preparation	4 (0.9)	0.0	4 (2)
Liver protectants	0.0	2 (0.4)	2 (1)
Probiotics	5 (1.1)	1 (0.2)	6 (3)
Prokinetics	6 (1.3)	1 (0.2)	7 (3.5)
Hormonal supplements	3 (0.7)	1 (0.2)	4 (2)
Steroids	3 (0.7)	1 (0.2)	4 (2)
Antianxiety	4 (0.9)	0.0	4 (2)
Antimalarial	0.0	1 (0.2)	1 (0.5)
Skin protectants	0.0	1 (0.2)	1 (0.5)
Ear preparation	2 (0.4)	0.0	2 (1)
Thyroid drugs	3 (0.7)	2 (0.4)	5 (2.5)
Antigastric drugs	75 (16.3)	24 (5.2)	99 (49.5)
Laxatives	8 (1.7)	2 (0.4)	10 (5)
Antidiabetic	25 (5.4)	9 (2.0)	34 (17)
Vitamins	38 (8.3)	20 (4.3)	58 (29)
Antiemetic	31 (6.7)	26 (5.7)	57 (28.5)
Antipyretics	19 (4.1)	6 (1.3)	25 (12.5)
Antidiarrheal	6 (1.3)	12 (2.6)	18 (9)
Antifungal	0.0	1 (0.2)	1 (0.5)
Analgesic	34 (7.4)	19 (4.1)	53 (26.5)
Antiepileptic	11 (2.4)	3 (0.7)	14 (7)
Anticoagulant	9 (2.0)	4 (0.9)	13 (6.5)
Diuretic	9 (2.0)	3 (0.7)	12 (6)

antibiotics. There is a concern that there may be an increasing bacterial resistance in childhood and that changes in childcare practices, particularly the marked increase of daycare in pre-school groups, may lead to the increasing transfer of antibiotic-resistant organisms within these environments.[14,3] Infections caused by resistant pathogens have a significant impact on patient morbidity and mortality.[7]

Antibiotics are among the most frequently prescribed drugs worldwide. According to the results of studies carried out in European countries and the United States, 23–38% of inpatients are given some kind of systemic antibiotic treatment. Antibiotics take the lead among the most commonly used drugs in Turkey and account for 20% of the drug market.[2,1]

Unfortunately, 20–50% of antibiotic treatment is used irrationally. The fact that one of the most important causes of acquiring resistance is the lack of rational antibiotic use has been reported in many studies and has taken its place in the literature as evidence. Inappropriate use of antibiotics leads to some undesired effects such as an increase in mortality and morbidity, drug toxicity, extended periods of hospitalization, and an increase in expenditures.[9,4]

Antibiotics are powerful and effective drugs in the fight against infectious diseases caused by bacteria and have saved millions of lives since their first appearance about 50 years ago. Rational use of antibiotics is extremely important as injudicious use can adversely affect the patient, cause emergence of antibiotic resistance and increase the cost. As per the World Health Organization, rational use of drugs requires that patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements for an adequate period of time, and at the lowest cost to them and their community (WHO, 1987).[16,5] The use of antibiotic prophylaxis has been shown to prevent post-surgical wound infection. When employed rationally, a significant reduction in the mortality and morbidity and saving in resources can be achieved. The purpose of antibiotic prophylaxis is to prevent post-operative infections, which are the primary cause of morbidity and mortality in patients undergoing surgery today. Aseptic techniques alone could decrease but do not completely eliminate bacterial contamination of the surgical field. Therefore, the need for antibiotics to supplement aseptic technique becomes more widely accepted.[12,11]

Antibiotics are prescribed more by emergency physicians and family practitioners, and patients who are seen in the emergency room and the family practitioner's office are more likely to receive antibiotic prescriptions. Furthermore, about 85% of all the antibiotic prescriptions are issued by general practitioners. Antimicrobial agents are the most commonly used and misused of all the drugs. The inevitable consequence of the widespread use of antimicrobial agents has been the emergence of antibiotic-resistant pathogens. It has been reported that antimicrobials had been used in excess for decades that only 25% of the patients with respiratory illnesses had any bacterial etiology and that about 52% of all the antibiotic prescriptions for respiratory illnesses were not clinically indicated at all. As a result, antimicrobial resistance and therapeutic costs have increased significantly. Drug utilization includes the prescribing, dispensing, and the ingesting of drugs. A drug utilization study as defined by the WHO, as a structured process which is used to assess the quality of drug therapy by engaging in the evaluation of data on drug prescribing, dispensing, and patient use in a given health-care environment, against predetermined, agreed on criteria and standards, with special emphasis on the resulting medical, social, and economic consequences.[10,16] For all the above cases, prescribing pattern of antibiotics utilization in surgery, pediatric, and general medicine wards in a tertiary care hospital, Bengaluru, India, is so important and need for study.

MATERIALS AND METHODS

This study was conducted at Bengaluru Aster CMI Hospital Hebbal a multispecialty tertiary care teaching hospital. The

Table 2: Drug interactions in our study population

Interacting drug/object drug	Effect of interaction	Male (%)	Female (%)	Total (%)
Major				
Ciprofloxacin+metronidazole	QT prolongation	11 (7.4)	12 (8.1)	35 (11.5)
Fluconazole+metronidazole	QT prolongation	1 (0.7)	1 (0.7)	3 (1)
Metronidazole+promethazine	QT prolongation	2 (1.3)	2 (1.3)	4 (2)
Cefoperazone+heparin	Increase risk of bleeding	2 (0.7)	3 (1.3)	5 (1.5)
Metronidazole+ondansetron	QT prolongation	9 (4.7)	3 (0.7)	12 (4)
Ondensatron+azithromicin	QT prolongation	2 (0.7)	0.0	1 (0.5)
Ciprofloxacin+metformin	Hypoglycemia	2 (0.7)	9 (6.0)	10 (5)
Aminophylline+azithromycin	Affect theophylline metabolism	2 (0.7)	0.0	2(0.5)
Gentamicin+vancomycin	Increase risk of nephrotoxicity	2 (0.7)	0.0	2 (0.5)
Erthromycin+metronidazole	QT prolongation	2 (0.7)	0.0	2 (0.5)
Domperidone+azathioprine	QT prolongation	11 (5.4)	4 (1.3)	15 (5)
Domperidone+ondansetron	QT prolongation	2 (0.7)	0.0	2 (0.5)
Metronidazole+domperidone	QT prolongation	15 (6.0)	13 (5.4)	28 (8.5)
Ciprofloxacini+ondansetron	QT prolongation	16 (7.4)	4 (1.3)	20 (6.5)
Moderate				
Ampicillin+pantoprazole	Loss of ampicillin efficacy	4 (2.7)	3 (0.7)	7 (2.5)
Metformin+insulin	Hypoglycemia	2 (0.7)	0.0	2 (0.5)
Metronidazole+diclofenac	Increase diclofenac exposure	3 (1.3)	6 (2.7)	9 (3)
Minor				
Coamoxiclav+gentamycin	Loss of aminoglycoside efficacy	3 (1.3)	5 (2.0)	8 (2.5)
Aminoglycoside+clavulanic acid	Loss of aminoglycoside efficacy	2 (0.7)	0.0	2 (0.5)
Amoxicillin+Prometrium	Decrease contraceptive effectiveness	1 (0.7)	2 (0.7)	3 (0.5)

hospital has various departments such as medicine, surgery, pediatrics, gynecology and obstetrics, orthopedics, ear nose throat (ENT), nephrology, psychiatry, and dermatology.

In this method, the inpatient case sheets and prescriptions will be screened for analysis of prescriptions for various effects of antibiotics on a daily basis. All the prescribed medications along with other medications and relevant information will be noted in a customized data collection form to find out the antibiotics utilization and other. The study patients will be followed daily until their discharge. The Micromedex, Medscape, articles, and relevant references books will be used as tools to review the collected data. The prescribed medication will be checked for their existence in the hospital and also the relevant dosing calculation and antibiotics. Check for any error in prescription such as doses, frequency, and route of administration, and analysis of prescription for any antibiotics utilization.

A total of 300 inpatients were included in this study. Prescriptions and treatment chart of inpatients were reviewed prospectively for prescribed patterns of proton pump antibiotics. The admission register is reviewed for prescription of any antibiotics. The case sheet, treatment chart, and physician notes will be subjected for capturing any information related to the study.

All medically relevant information was noted in a predefined data collection form. Alternatively, these case charts were reviewed for prescription of antibiotics. The demographic data and the detailed history of the patient regarding past, present, family, personal, and drug history were taken. The other details such as the present diagnosis, reason for the present admission, and any investigations done to confirm the diagnosis were also noted.

All the outpatients/inpatients prescriptions presented at inpatient pharmacy collected on a daily basis and for antibiotics utilization, the prescriptions reviewed and it is noted in a predefined data collection form. The prescription components, drug utilization behavior, and prescribing compliance to hospital formulary were noted and subjected for analysis of prescriptions for various effects of antibiotics.

RESULTS AND DISCUSSION

A total of 300 patients who were admitted to the hospital were affected by infection. In our study population, out of 300 patients, 182 were male and 118 were female, and in pediatric population 15% were male and 12.5%. In the surgery department the highest number, i.e., 12.5% male and

Table 3: Study patients based on number of antibiotics prescribed

Class of antibiotics	Monotherapy		Combination therapy	
	Number of male prescribed (%)	Number of female prescribed (%)	Number of male prescribed (%)	Number of female prescribed (%)
Penicillin	27 (13)	15 (7)	24 (11.5)	15 (7)
Macrolides	10 (4.5)	6 (2.5)	6 (2.5)	4 (1.5)
Cephalosporin's	10 (4.5)	10 (4.5)	17 (8)	8 (4.5)
Fluoroquinolones	9 (4)	5 (2)	20 (8)	13 (6)
Nitroimidazoles			29 (14)	12 (5.5)
Lincosamide			5 (2)	2 (0.5)
Akt kit			6 (2.5)	

9.5% females are in the age group 31–40 years. 2% males and 2.5% females were in the age group of 81–90.

In our study, 5% male and 2% females were suffering from GIT ailments, 6% males and 2% females from appendicitis, 2.5% male and 6% females from pancreas related problems, 16% male 5.5% females had pulmonary related problems, 0.5% males and 2% females had central nervous system related problems, 3% males and 4% females had cardiovascular system related problems, 0.5% female had ENT related problem, 2% males and 0.5% females had bone-related problems, 13% male and 3% females had liver-related problems, 1% male and 4% females had genitourinary problems, 2% male and 1.5% females had fever, and 4.5% male and 2.5% females were suffering from dengue [Table 3].

In our study, various class of antibiotics such as penicillin's, macrolides, cephalosporins, and fluoroquinolones were prescribed. Out of which 13% males, 7% females were prescribed with penicillin's which were highest among monotherapy. Among combination therapy, 14% of males were prescribed and 7% females with penicillin are which were highest. There were various combination drugs prescribed which are specific to the disease out of which ampicillin + gentamicin + metronidazole (5%) and ampicillin + gentamicin + cefotaxime + aminoglycoside (5%) [Table 3].

Various class of drugs are prescribed in our study population based on the patient condition, and comorbidities out of which 16.3% males, 5.2% females are prescribed with anti gastric drugs which were highest followed by vitamins and analgesics, least used drugs were skin protectants [Table 1].

Out of 300 prescriptions, the number of drugs encountered per prescription is 6 ± 1.2. There were a total of 172 drug interaction found out of which drug interaction with ciprofloxacin+ondansetron and ciprofloxacin+metronidazole leading to QT prolongation is highest with 11% males in both and 2% females in former and 12% females latter [Table 2].

For general medical ward, the clinical conditions for which antibiotics were prescribed are respiratory tract infection (24%), urinary tract infection (18%), gastroenteritis (18%), typhoid fever (16%), septicemia (13%), meningitis (8%), and pyrexia of unknown origin (3%), which is shown in Table 1. A total of 840 drugs were prescribed. Average number of drugs per prescription was 4.2. A total number of 373 antibiotics were prescribed, and average numbers of antibiotic per prescription were 1.83. Commonly given antibiotics were ceftriaxone (30.03%), coamoxiclav (22.6%), aminoglycoside (16.33%) ciprofloxacin (13.41%), metronidazole (12.34%), and levofloxacin (5.09%). Out of 373 antibiotics prescribed, 332 (89%) were written in trade name and 41 (11%) in generic name [Table 4].

Table 4: Cause of antimicrobial agent's prescription

Disease	Number of patients (%)
RTI	48 (24)
UTI	36 (18)
Gastroenteritis	36 (18)
Typhoid fever	32 (16)
Septicemia	26 (13)
Meningitis	16 (8)
PUO	6 (3)

RTI: Reproductive tract infections, UTI: Urinary tract infection

The antibiotics prescription in our study population is compared with hospital policy and international hospital policy for each disease in which. 23.3% males and 13% females followed first line hospital policy which is highest among the reasons for following the hospital policy. Prescriptions of patients who did not follow hospital policy are 5% male 5% female. In our study, most of the antibiotic prescription was according to hospital policy [Figure 1].

CONCLUSION

A total of 300 drugs were prescribed, and thus the average number of drugs per patient was 7. Among studied patients, 3.67% were using 1–3 medication followed by 27.14% of patients using 4–6 medications. Extensive (70%) antibiotics were observed in the study population.

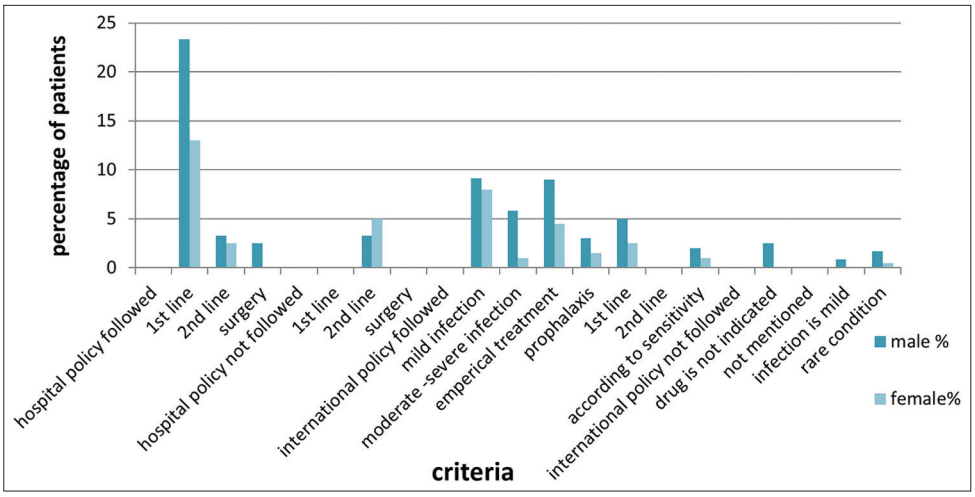

Figure 1: Bar chart representation of hospital policy compliance in our study population

Our study concluded that most common disease for which antibiotics prescribed was respiratory tract infection. Most common antibiotic used was ceftriaxone, more than one antibiotic was prescribed, and only 11% of antibiotics were prescribed in generic name. A strict protocol for prescribers is required to promote rational use of antibiotics which would not only prevent antibiotic resistance but also reduce the treatment expenditure.

Most common antibiotic used was ceftriaxone. Number of antibiotics prescribed per prescription was 1.83. Antibiotics were mostly prescribed by brand name. The concluded the adherence to hospital policy in prescribing antibiotics was largely seen.

Inappropriate use of antibiotics is detected due to lack of culture sensitivity test which has to make mandatory in the hospital before antibiotic prescription.

Less cost-effective antibiotic treatment should be prescribed. In our study, Polypharmacy was seen in a large extent were patients were put on 4–5 antibiotics ,which also has to be avoided by using broad spectrum antibiotics and fixed dose antibiotics suitably. The drug interactions with antibiotics should be also minimized.

Prescribers should be suggested to prescribe the drugs by their generic names. Prescribing the drugs by its generic names can reduce prescribing and dispensing errors, and also benefit inventory control.

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