

Prescribing indicators and pattern of use of antibiotics among medical outpatients in a teaching hospital of Central Nepal

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Abstract

The study of prescriptions using prescribing indicators enables us to detect some common problems of prescribing and to focus subsequent efforts to correct them. This study was designed to define the extent and pattern of drug prescribing with emphasis on that of antibiotics among medical outpatients of teaching hospital of College of Medical Sciences Bharatpur, Nepal. The data contained on randomly selected original prescriptions of patients attending medical OPD in between January 2008 and June 2008 were collected prospectively on duplex prescriptions and analyzed. A total of 955 drugs were prescribed to 339 patients. The average number of drugs per encounter was 2.81. Drugs prescribed by generic name were 20.31% and those matched to national essential drugs list were 49.63%. Encounters with antibiotics were 43.95%. Antibiotics were the most frequently prescribed therapeutic class. Azithromycin, ciprofloxacin and amoxycillin were three most frequently prescribed antibiotics. Respiratory tract infection was the most common indication, for which antibiotics were given. Selections of antibiotics were rational for most of the indications but bacteriological confirmation prior to institution of antibiotics were not done in any case. Polypharmacy, inclination for branded products and overuse of antibiotics were revealed as problems requiring educational interventions and strict antibiotic policy as subsequent efforts to rectify them.

Key words: Antibiotics, medical outpatients, prescribing indicators, teaching hospital.

Introduction

The drug prescribing remains the end result of most of the medical consultations. This is one clinical skill that almost every physician practises regularly to transact the desired therapeutic goal. This is one important skill as the outcome of drug therapy depends much on this.

Drug is one of the most important components of the health care delivery system and account for a large

percentage of its cost. These facts warrant the rational prescribing as an essence of a cost-effective medical care. Rational prescribing refers to prescribing of right drug to the right patient, in the right dose, at right time intervals and for right duration. However, irrational prescribing has been widely reported both from the developed as well as the developing world¹. The cost of irrational use of drugs consequent to irrational prescribing is enormous in terms of both scarce resources and adverse clinical consequences such as

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ineffective or unsafe treatment, exacerbation or prolongation of existing illness, iatrogenic illnesses and emergence of resistance to antimicrobials. Antibiotics have been found to be the most commonly prescribed and used class of drugs in several national and international studies.^{2,3,4,5} The emergence of antibiotic resistant bacterial pathogens on a large scale over last two decades is taken as an inevitable consequence of these over uses of antibiotics worldwide.^{6,7} Strategies that optimize antibiotic use are therefore essential to minimize this microbial threat to suffering as well as to treating community of world. Prescribing indicators are one of the core drug use indicators developed by World Health Organization (WHO) in a collaborative work with International Network for Rational Use of Drugs (INRUD)⁸. These indicators can be used efficiently in many settings of drug use study to detect problems in drug prescribing such as polypharmacy, inclination for branded products, over use of antibiotics or injections and prescribing out of formulary or essential drugs list⁹. Study of prescribing practices using prescribing indicators enables us to detect these problems and to prioritize and focus subsequent efforts to correct them. Such studies accompanied with providing feedbacks to prescribers at regular intervals has been proved to be an effective strategy to optimize the use of antibiotics and other drugs and also to reduce the resistance related problems.^{8,9,10} Various problems of prescribing including the overuse of antibiotics have been revealed in studies carried out in hospitals of other regions of Nepal.^{2,3} Polypharmacy, non-adherence to national formulary and inclination of prescribers for branded and fixed dose combination products were revealed in a previous study conducted among orthopedic outpatients in the teaching hospital of College of Medical Sciences Bharatpur.¹¹ However, the

information on the prescribing practices of antibiotics and other drugs among medical outpatients in this hospital is lacking. This study was undertaken therefore with an objective to define the extent and pattern of drug prescribing with a special reference to that of antibiotics among medical outpatients in this hospital and to delineate areas of improvement. This study was attempted also to highlight the subsequent needed efforts by the prescribers to correct them and to make their practices more rational and cost-effective. This study will serve to generate the basic data for more comprehensive study in the future and for a comparative study by other investigators.

Materials and methods

This cross-sectional descriptive study was conducted at the teaching hospital of College of Medical Sciences Bharatpur. This is a tertiary care hospital located in the Chitwan district of Central Nepal. Patients were approached for their prescriptions at the pharmacy of the hospital on a prefixed day in each week in between January 2008 and June 2008. Only freshly registered medical outpatients were selected randomly for this study. Revisit cases and prescriptions with admission order were excluded from this study. All informations contained on each selected prescription were recorded on the duplex prescription papers having all the columns of an original prescription paper. Each patient was explained the nature and purpose of study well before recording the data from his or her prescription. The data was collected prospectively by this method from 339 original prescriptions belonging to same number of patients selected for this study. Prescriptions were analyzed strictly under WHO guidelines to get the value of each of prescribing indicators.⁸ Analysis of prescriptions were done also

to get the distribution of different therapeutic classes of prescribed drugs, the distribution of classes of antibiotics and frequently prescribed individual antibiotics. Prescriptions were further analyzed to get the pattern of frequently prescribed individual antibiotics against different diagnosis. Each of fixed dose combination drugs was counted as a single drug. Antitubercular drugs and anti-protozoals such as Metronidazole and Tinidazole were not counted as antibiotics as per the instructions of WHO.⁸ Prescribed drugs were compared with those included in the latest Essential Drugs List of Nepal¹² to measure the deviation from the national formulary. The number and the percentage were used to express the observed data.

Results

A total of 339 prescriptions belonging to same number of patients contained a total of 955 drugs. The average number of drugs per encounter was 2.81. Two hundred and thirty two patients (68.4%) were prescribed 2-3 drugs. More than three drugs were prescribed in 77(22.8%) patients. Thirty (8.8%) patients received only one drug. Only 194 (20.31%) drugs out of total 955 drugs were prescribed by generic name. Drugs prescribed from essential drugs list of Nepal were 474(49.63%). Prescribing indicators are detailed in Table-1.

Table 1: Prescribing indicators among medical outpatients

Prescribing indicators	No.	%
Prescriptions Analyzed	339	100
Drugs Prescribed	955	100
Average Number of Drugs/Encounter	2.81	-
Encounters with an Antibiotic	149	43.95
Encounters with an Injection	008	2.36
Drugs Prescribed By Generic Name	194	20.31
Drugs Prescribed From Essential Drugs List of Nepal	474	49.63

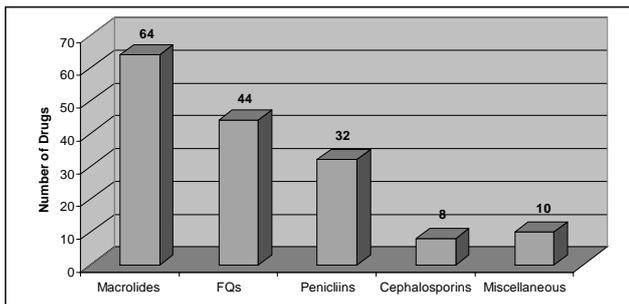
Antibiotics were the most frequently prescribed therapeutic class followed by drugs for peptic ulcer syndrome, non-steroidal anti-inflammatory drugs, multivitamins and anti-histaminics. Other commonly prescribed classes were anthelmintics, cough and cold remedies, anti-protozoals, bronchodilators and anti-hypertensives. Among 149 patients who received antibiotic, only 9 patients were exposed to two antibiotics concurrently and rest of the patients were exposed with only one antibiotic. Antibiotics constituted 16.54% of totally prescribed drugs. Table-2 shows the prescribing frequency of different therapeutic classes.

Table 2: Therapeutic classes of drugs prescribed

S.N.	Therapeutic Class	No.	%
1.	Antibiotics	158	16.54
2.	Drugs for Peptic Ulcer Syndrome	147	15.39
3.	NSAIDs	122	12.77
4.	Multivitamins	79	8.27
5.	Anti-histaminics	68	7.12
6.	Anthelmintics	58	6.07
7.	Cough & Cold Remedies	41	4.29
8.	Antiprotozoals	39	4.08
9.	Bronchodilators	35	3.66
10.	Antihypertensives	31	3.24
11.	Anti-emetics	24	2.51
12.	Antidepressants	24	2.51
13.	Anti-spasmodics	12	1.25
14.	Anti-diabetics	12	1.25
15.	Nasal decongestants	12	1.25
16.	Miscellaneous drugs (Antiseptics, Antivirals, Anti-Tb, Steroids etc.)	93	9.73
	Total	955	100

Macrolides ranked the first among prescribed classes of antibiotics followed by fluoroquinolones and beta-lactams. Figure-1 describes the prescribing frequency of different classes of antibiotics.

Figure 1: Prescribing frequency of classes of antibiotics



Five most frequently prescribed individual antibiotics in decreasing order were azithromycin, ciprofloxacin, amoxicillin, ofloxacin and norfloxacin. Figure-2 details the prescribing frequency of individual antibiotics.

Figure 2: Prescribing frequency of individual antibiotics

Ofloxacin were used to treat cases of enteric fever. Further analysis of prescriptions containing two antibiotics revealed that Amoxicillin and Clarithromycin were those two antibiotics and they had been prescribed only for all those nine cases where Helicobacter pylori infections were suspected as the cause of peptic ulcer syndromes. Diagnosis was not mentioned at all in 14 cases and antibiotics were prescribed also for these cases. Pattern of five most frequently prescribed antibiotics for different diagnosis has been detailed in Table 3.

Table 3: Pattern of five most frequently prescribed antibiotics for different diagnosis

Diagnosis	No. (%)	Azithromycin	Ciprofloxacin	Amoxicillin	Ofloxacin
Enteric Fever	55 (36.5)	17 (31.1)	15 (27.3)	12 (21.8)	11 (20)
Respiratory Tract Infection	24 (15.7)	11 (45.8)	9 (37.5)	4 (16.7)	0
Urinary Tract Infection	21 (13.3)	11 (52.4)	8 (38.1)	2 (9.5)	0
Pyrexia of Unknown Origin	11 (7.2)	4 (36.4)	4 (36.4)	3 (27.3)	0
Diagnosis Not Mentioned	14 (9.1)	0	0	0	14 (100)
Total	149 (100)	53	24	21	11



Reasons for antibiotic institution in decreasing order were respiratory tract infections (RTIs), urinary tract infections (UTIs), gastrointestinal infections (GITIs), enteric fever and pyrexia of unknown origin (PUO). Azithromycin and Amoxicillin were two most frequently prescribed antibiotics for respiratory tract infections. Ciprofloxacin and Norfloxacin were preferred for urinary tract infections. Ciprofloxacin or

Ofloxacin were used to treat cases of enteric fever. Out of 135 patients for whom the diagnosis was mentioned, it was made only clinically in 112(75.16%) cases. Clinical findings and the reports of laboratory investigations were employed to diagnose only 8 cases. Clinical and radiological findings were combinedly considered to diagnose 5 cases and for another each 5 cases, decision was based on the reports of either laboratory investigations or radiological examinations. Antibiotics were prescribed therapeutically in 103(69.12%) patients and prophylactically in

46(30.88%) patients. The therapeutic or the prophylactic use of antibiotics was ascertained only clinically. Institution of antibiotic for therapeutic purpose was empirical in all 103(69.12%) patients and a prior bacteriological confirmation was not considered in even a single case. Antibiotics were instituted by oral route in 150(94.94%) instances and parenteral route was preferred in 8(5.06%) instances only.

Discussion

The average number of drugs per encounter is the most commonly measured index that is used to assess the extent of polypharmacy. The value of this index observed in our study was 2.81. The same value for this index was observed in a previous study conducted among orthopedic outpatients in our hospital.¹¹ Our observed value represents a better figure in comparison to those reported in studies of Eastern Nepal²(5.3), India⁴(3.75), Bangladesh¹³(3.81), Iran⁵(3.43) and Nigeria¹⁴(3.5). However this is not better than those reported in the studies of Western Nepal³(1.5), Pakistan¹⁵(2.7), Saudi Arabia¹⁶(2.1) and Sudan¹⁷(1.9). The WHO recommends that the average number of drugs per prescription should be less than two.⁸ The observed value in our study therefore may be taken as an evidence of existing polypharmacy. This index should be kept as low as possible to avoid the unfavorable outcomes of polypharmacy such as increased risk of drug interactions, increased cost of therapy, non-compliance and emergence of resistance in case of use of antimicrobials. Five most commonly prescribed therapeutic classes in our study were antibiotics, drugs for peptic ulcer, NSAIDs, multivitamins and antihistaminics. Antibiotics, NSAIDs, drugs for peptic ulcer and antihistaminics were

reported as most common classes also in the study of Western Nepal.³ Antibiotics, analgesics and anti-inflammatory drugs and vitamins were most frequently classes observed in the study of Eastern Nepal.² Antibiotics and NSAIDs were reported as two most frequently prescribed classes also in the studies of Saudi Arabia¹⁶ and Iran⁵. Antibiotics were the most commonly prescribed group also in the Indian study.⁴ Our as well as other studies thus confirm the antibiotics as most widely prescribed and used class of drugs. In the studies of eastern and western Nepal, antibiotics were prescribed in 84% and 59.9% of encounters respectively.^{2,3} In the studies conducted in Bangladesh¹³, Pakistan¹⁵, Nigeria¹⁴ and United Kingdom¹⁸ encounters with one or more antibiotics were found to be 72.5%, 52%, 54.8% and 77% respectively. Our study revealed a better figure in this concern as encounters with an antibiotic were less than these reports i.e. only 43.95%. However this value is not better than that reported in a Jordanian study¹⁹ where only 35.6% encounters contained antibiotics. This is a higher figure also in the context of suggestion made by the WHO that less than 30% of encounters should include one or more antibiotics.⁸ Our study report thereby is an indication that antibiotics are overused in our hospital. But prescribers in our hospital seem to be rational regarding the use of antibiotics as in majority of cases only one antibiotic has been prescribed and only nine patients got two antibiotics concurrently. Among those who got two antibiotics, peptic ulcer syndrome due to *Helicobacter pylori* were suspected strongly and Amoxicillin and Clarithromycin were prescribed as a part of triple drug regimen to eradicate this microbe. Prescribing Azithromycin and Amoxicillin for respiratory tract infections,

Ciprofloxacin and Norfloxacin for urinary tract infections and Ciprofloxacin and Ofloxacin for enteric fever cases also point towards a rational approach of prescribers. This is also favored by this fact that antibiotics were given only through oral route in about 95% instances. However, overuse of antibiotics should be discouraged as this contributes to emergence of resistance²⁰. Institution of antibiotics only on the basis of clinical diagnosis and without a prior bacteriological confirmation was observed in majority of cases of this study. This was practiced in an outpatient setting where bacteriological confirmation was not possible in one day. Even after this fact, this kind of practice is not justified for the above mentioned reason and should be discouraged as far as possible.

Encounters with an injection in our study were found to be only 2.36%. This is a far below and favorable figure in comparison to that set forth by WHO in this concern i.e. less than 10%.⁹ This proves that prescribers in our hospital are more aware and rational regarding use of injections. Drugs prescribed by generic name in our study were observed to be 20.31%. In a previous study conducted among orthopedic outpatients in our hospital, only 7.2% drugs were prescribed by generic name.¹¹ Therefore the finding of present study proves an improvement in our hospital regarding prescribing by generic name. However, our observed value is low in comparison to that observed in the study of eastern Nepal where 29.3% drugs were prescribed by generic name.² Our finding is a remarkably low figure in comparison to those reported in the studies of western Nepal³(63.5%), India⁴(96.5%), Iran⁵(97.2%) and Sudan¹⁷(43.6%). Prescribers in our hospital thus seem to be inclined towards branded products. The most likely reason behind this inclination might be either highly powered

salesmanship of drug manufacturing companies to sell their products or the unawareness among prescribers for the advantages of generic prescribing. Prescribing by generic name offers several advantages including less cost of therapy and less dispensing errors and this needs to be promoted among prescribers of our hospital. Drugs prescribed from essential drugs list of Nepal were 49.63% in the present study. The observed value in the previous study of orthopedic outpatients of this hospital in this regard was 46.2%.¹¹ The observed value of present study thus appears to be slightly improved in comparison to previous one. However this is not better than those observed in the studies of western Nepal³ and Bangladesh¹³. Apart from unawareness regarding benefits of prescribing from essential drugs list, the unavailability of hospital formulary or national list in the hospital or pharmacy seems to be reasons for the observed deviation. Prescribing from such list is beneficial in terms of cost-effectiveness and safety as drugs are selected with due regard to local disease prevalence, evidence of efficacy and safety and the cost. Prescribing from such list should be encouraged to ensure rational use of medicines.

Conclusion

There is a much scope for improvement consequent to this study. Polypharmacy, non-adherence to national formulary, inclination for branded products and overuse of antibiotics are different problems that needs attention by prescribers. Educational interventions emphasizing rational prescribing along with a multidirectional effort to create an updated local formulary and a strict antibiotic prescribing policy can help significantly to overcome these problems and to reduce the extent of resistance to antibiotics.

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