

**Original Article**

**PATTERNS OF PRESCRIPTION AND ANTIBIOTIC USE AMONG OUTPATIENTS IN A TERTIARY CARE TEACHING HOSPITAL OF BANGLADESH**

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**ABSTRACT**

**Objective:** Irrational drug use increased the risk of adverse drug reactions (ADRs), the emergence of drug resistance and a leading cause of morbidity and mortality worldwide. The study was designed to analyse prescription patterns and antibiotic use among outpatients in a tertiary care teaching hospital in Bangladesh.

**Methods:** This prospective survey was conducted among the out-patients in a district hospital. The prescribed drugs were classified according to Anatomical and Therapeutic Chemical (ATC) classification system. Patient characteristics and drug data were recorded. The prescription pattern was analysed using general drug use indicators according to World Health Organisation (WHO).

**Results:** A total of 405 prescriptions were analyzed of which 54% of child and 46% of adult prescriptions. The age and body weight of the patients were not mentioned in 30% of child and 62% of adult prescriptions and none of the prescriptions included sex of the patients. Physician's handwriting was not clear and legible in 31% prescriptions. A total 1362 drugs were used in this study with an average 3.36 drugs per prescription. However, none of the drugs was prescribed in generic name. Children were highly exposed to antibiotics (66%) than to adults (44%) of which cephalosporin's (30%) and macrolides (14%) were commonly used. Interestingly, non-steroidal anti-inflammatory drugs (NSAIDs) were also highly accounted in children (53%) than to adults (36%).

**Conclusion:** Our results suggested that the prescription information was incomplete and physicians did not follow the standard guideline for drug treatment resulting in polypharmacy and indiscriminate use of antimicrobials irrespective to the age of patients.

**Keywords:** Prescription pattern, Irrational drug use, Polypharmacy, Prescribing indicators, Antibiotics, NSAIDS

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**INTRODUCTION**

Medically inappropriate, ineffective, non-economical use of medicines is commonly observed in healthcare system around the world and the prevalence is high in developing countries [1]. Inappropriate prescription not only increases the cost of medical treatment but also increases the morbidity and mortality. Drug utilisation research was defined by WHO as the marketing, distribution, prescription and use of drugs in a society with special emphasis on the resulting medical, social and economic consequences [2]. Periodic evaluation of drug utilisation studies needs to be done to enable prescription of suitable medications and thus to improve the therapeutic benefits with reduction of adverse effects. Studies on the prescribing pattern are powerful exploratory tools to ascertain the role of drugs in society. However, the processes need to be monitored timely to suggest and implement necessary alterations or modifications in current practices [3], but there is a paucity of such studies at national and international level [4]. The people in the third world spends 30-40% of their total health budget on drugs many of which are prescribed irrationally. These countries double their expenditure on drugs every 4 y while Gross National Product (GNP) doubles in every 16 y [5]. Also, the world health organisation reports that more than half of all medicines are prescribed, dispensed or sold inappropriately, and half of the patients fail to take them correctly [6].

Antibiotics have effectively prolonged the life expectancy and are currently the most commonly prescribed drugs in hospitals worldwide [7]. However, studies indicated that antibiotics are among the major group of drugs which cause ADRs [8]. Bangladesh has made substantial progress in drug manufacturing since the promulgation of 'Drug Control Ordinance 1982' but irrational use,

inappropriate prescribing and unjustified self-medication of antibiotics have increased the cost of therapy and the risk of emergence of resistant organisms. The prescription procedure of antibiotics in Bangladesh is less than ideal as prior identification of the pathogens and its sensitivity to the drug is rarely determined before the drug is prescribed [9]. Studies estimated that 30-50% of the total pharmaceutical cost is spent on antimicrobial agents in Bangladesh, India, Thailand and Tanzania [10-12]. These expenditures are much greater than those in the United Kingdom whereby it accounts 4-15% of total costs [13]. In Bangladesh, there are enough evidence of growing resistance to antimicrobials resulting from misuse of antibiotics [14, 15]. Therefore, research is needed to evaluate the antibiotic usage patterns so that interventions can be developed and implemented. There may be a striking variation in the pattern of drug use from country to country and in different areas of an individual country [16]. Thus, drug utilisation based on operational research is valuable tools for the provision and maintenance of adequate pharmaceutical services to the majority of the population [17]. This survey based research was designed to analyze the drug prescribing pattern and the use of antibiotics among the children and adult in Bogra district of Bangladesh.

**MATERIALS AND METHODS**

**Study design and data collection**

This prospective cross-sectional study was conducted to the outpatients visiting physicians in hospitals in Bogra district situated in the north-west of Bangladesh. Prescriptions were randomly collected from patients over a period of three months from January to March' 2014. The physician was categorised into three groups

group-1, a physician having FCPS/Ph. D/MD and other post-graduate degrees, group-2 physician having PGT/EMOC and others diploma, group-3, a physician having MBBS degree only. The average number of patients visiting each physician per day was about 25-30. For this purpose, a self-designed standard questionnaire was developed by the principal investigator. The questionnaire contained demographic variables and drug data of the patients. All the information was recorded from the prescriptions and interviewing the patients according to the standard data collection chart.

#### Study subjects

A total of 405 prescriptions were collected from the patients at the door of physicians. Among them, 219 (54%) were child prescriptions and 186 (46%) were adult prescriptions with age ranges from 1 mo-12 y for the child and 12-65 y for an adult. The patients who were unconscious, mentally retarded or suffering from the psychiatric disorder and admitted into hospitals were excluded from the study. The patients who are willing to participate into this survey were considered as the subject. The human subjects involved in this study did not use any hazardous agents and no samples were collected from them.

#### Statistical analysis

The prescriptions were considered perfect when all information from the patient regarding the disease and medication were completely recorded. The name of patient and prescribing doctors were kept confidential throughout the study. The prescribed drugs were classified according to WHO-ATC classification system. Patient

characteristics and drug data were calculated and analyzed using Microsoft Excel sheet and statistical software SPSS version15. The results were expressed as a number, mean and percentages (%). The drug utilisation patterns were evaluated according to the WHO core indicators [18] and are given below:

1. Average number of medicines prescribed per patient
2. % of drugs prescribed by generic name
3. % of encounters with an antibiotic prescribed
4. % of encounters with anti-inflammatory drugs prescribed
5. % of encounters with drugs for acid-related disorder
6. Diagnosis for the disease

Besides these, age and sex distribution, the weight of patient, physician handwriting, most commonly prescribed drugs and types of antibiotics used were also taken into consideration.

#### RESULTS

Our present study indicated that a total of 405 patient's prescriptions were reviewed of which 219 (54%) were from child and 186 (46%) from adults. A prescription from a group-1 physician was 162 (40%), the group-2 physician was 141 (35%), and the group-3 physician was 102 (25%). Among the patients male and female were 207 (51%) and 198 (49%) respectively. Child patient's age ranges from 1month-12 y whereas adult age ranges from 12-65 y (table 1).

Table 1: Demographic characteristics of patients

Variables	Characteristics	Frequency	Percentage (%)
Type of patient	Children	219	54
	Adult	186	46
Type of physician	Group 1	162	40
	Group 2	141	35
	Group 3	102	25
Gender	Male	207	51
	Female	198	49
Age	Children	1 mo-12 y	
	Adult	12-65 y	

According to the study, physician's handwriting was not clear and legible in 126 (31%) prescriptions. None of the drugs was prescribed by generic name rather by proprietary (brand) name and sex of the patients was not included in any of the prescriptions. It was also found that the age and body weight of

the patients was not mentioned in 30% and 62% of prescriptions respectively. Although in 60% prescriptions chief complaints were mentioned, 39% prescriptions were assigned for the diagnostic test and only 52% patient's disease conditions were confirmed.

Table 2: Child and adult patients exposed to different number of drug(s) prescribed by general practitioner

Drugs/Patient	Child patients (N=219)	Adult patients (N=186)	Total (N=405)
	No. (%) of prescriptions	No. (%) of prescriptions	Total No. (%) of prescription
0	3 (1.36)	0	3 (0.74)
1	12 (5.47)	3 (1.6)	15 (3.7)
2	48 (22)	33 (17.7)	81 (20)
3	84 (38.35)	51 (27.4)	135 (33.33)
4	54 (25)	66 (35.5)	120 (29.63)
5	15 (7)	9 (4.8)	24 (5.93)
6	0	15 (8.1)	15 (3.7)
7	3 (1.36)	6 (3.2)	9 (2.22)
8	0	0	0
9	0	3 (1.6)	3 (0.74)
Total	219	186	405
Range	1-7	1-9	
Average	3.07	3.71	3.36

Our results demonstrated that a total of 1362 drugs were prescribed with an average of 3.36 drugs and the drug per prescriptions ranges from 1-9. It was also evident that 4 or more drugs were prescribed

in 171 (42%) prescriptions of which 24 prescriptions contain 5 drugs, 15 prescriptions contain 6 drugs, and 9 prescriptions contain 7 drugs. The highest number of drugs 9 was prescribed in 3 adult

prescriptions. More than 93% of the child patients were exposed to multiple drugs among which 3 and 4 drugs were prescribed in about 38% and 25% of prescriptions. In the case of adult patients, more than 98% of the patients were exposed to multiple drugs of which 3 and 4 drugs were prescribed in about 27% and 35% prescriptions respectively (table 2).

Table 3 shows the type of drugs used in children and adult prescriptions. The most commonly prescribed drugs were antibiotics 219 (54%) followed by NSAIDs 183 (45%), anti-

asthmatic 120 (30%), vitamins/minerals 114 (28%), anti-ulcerative 105 (26%) and anti-histamine 102 (25%). Steroids, anti-emetic and sedatives were also prescribed in 54 (13%), 48 (12%) and 48 (12%) prescriptions respectively (table 3). Our findings also suggested that physician is prescribed more NSAIDs, antihistamines, antiasthmatics and steroids in children than to adults. Interestingly, vitamin/minerals were used in both children and adult frequently.

However, antihypertensive, antipsychotic and sedative drugs were prescribed only in adults.

**Table 3: Type of drugs used in children and adult prescriptions**

Drugs	Child patients (N=219)		Adult patients (N=186)		Total (N=405)	
	No.	(%) of prescriptions	No.	(%) of prescriptions	No.	(%) of prescription
Antibiotics	144	(66)	75	(40)	219	(54)
NSAIDs	117	(53)	66	(36)	183	(45)
Antihistamine	72	(33)	30	(16)	102	(25)
Antiasthmatic/Bronchodilator	105	(48)	15	(8)	120	(30)
Vitamin/Minerals	63	(29)	51	(27)	114	(28)
Steroids	45	(21)	9	(5)	54	(13)
Anti-emetic	18	(8)	30	(16)	48	(12)
Antiulcerative	18	(8)	87	(47)	105	(26)
Anthelmintic	15	(7)	0		15	(4)
Antipsychotic	0		27	(15)	27	(7)
Antihypertensive	0		30	(16)	30	(7)
Sedatives	0		48	(26)	48	(12)

As shown in table 4 in children and adult the antibiotics prescribed were 66% and 40% respectively. The highest antibiotics prescribed to child patients was cephalosporins 66 (30%) followed by macrolides 30 (14%), quinolones 15 (7%), sulphonamides 18 (8%) and penicillins 15 (7%)

whereas adults received quinolones mostly 27 (15%) followed by penicillin 18 (10%), cephalosporin 15 (8%) and macrolides 12 (7%). It was to be noted that the use of single antibiotic was predominant (52.59%) with only a few combinations (1.48%).

**Table 4: Patients exposed to different types of antibiotic prescribed**

Group of physician	Antibiotics prescribed in children						Antibiotics prescribed in adult						
	P*	C*	M*	Q*	S*	Total	P*	C*	M*	Q*	S*	T*	Total
Group 1	3	33	9	9	6	60	6	3	0	6	0	0	15
Group 2	3	18	18	3	12	54	6	3	12	18	0	3	42
Group 3	9	15	3	3	0	30	6	9	0	3	0	0	18
Total	15	66	30	15	18	144	18	15	12	27	0	3	75

P=penicillin, C=cephalosporin, M=macriline, Q=quinolone, S=sulphonamide, T=tetracycline\*

## DISCUSSION

A prescription by a physician may be taken as a reflection of his attitude towards the disease condition and the role of drugs in its treatment [19]. The number of drugs per prescription is an important parameter in prescription auditing. According to WHO, the average number of drugs per prescription should be 2.0 [20]. In our survey, the average number of drugs prescribed was 3.36, and it was higher than that reported in studies conducted in government set up across India, 3.03 in Delhi [21] and 2.0 in North Goa [22]. However, a recent study reported higher rate 4.89 drugs per prescription in a government hospital in Bangladesh [23] and our data represented although not ideal but better than that reported earlier.

Irrespective to the age of patient more than 70% prescriptions contained 3 or more drugs indicating over the prescribing behaviour of the physicians. This may be due to the fact that treatment based on symptoms rather than the diagnostic tests. It is preferable to keep the mean number of drugs per prescription as low as possible, since poly-pharmacy can lead to increased risk of ADRs, development of bacterial resistance and increased the cost of therapy [24, 25]. Our data also revealed that none of the drugs was prescribed by generic name rather in the brand name which may be due to the vigorous promotional strategies by pharmaceutical companies that are undermining some of the goals of essential drug list concept. On the contrary, generic prescriptions may reduce overall expenditure on drugs, especially on newer antibiotics. So, we suggested that the practice of brand-name prescribing should be discouraged in Bangladesh as the use of generics is a cheaper alternative (table 5).

**Table 5: Assessment of WHO core drug use indicators**

Characteristics	Value
Total number of prescriptions	405
Total number of drugs prescribed	1362
Average number of drugs per prescription	3.36
% of drugs prescribed by generic name	0
% of diagnosis for the disease	52%
% of prescriptions containing antimicrobial agents	219 (54%)
% of prescriptions with anti-inflammatory drugs	183 (45%)
% of prescriptions with drugs for acid-related disorder	105 (26%)

According to WHO, in developing countries, 15-25% of prescriptions with antibiotics are expected where infectious diseases are prevalent [26]. Previous studies reported that the use of antibiotic was 78% in Bangladesh whereas it varied from 40-80% in India [23, 27]. In this study, the percentage of prescriptions with antibiotics was 54% which is less but do not comply WHO standard. In addition, it was found that the rural medical practitioners in Bangladesh prescribed 60% of antibiotics based on symptoms alone [28]. Our data showed that physicians are invariably prescribed antibiotic although 48% prescriptions had no advice for culture test which was not in accordance with the current guidelines [29]. In this study, antibiotics were the major drug class prescribed in children of which cephalosporin accounted 20% of total antibiotic use. It was high as compared to the study conducted in Nepal and Turkey but lower than that of India [30-32]. In Bangladesh, all the antibiotics were

prescribed on the basis of patient's complaints and also the antibiotics were used in inappropriate doses and durations particularly among the children under-five [33, 34]. High proportions of prescriptions of antibiotic by the physicians might be appeared to be a lack of confidence or misuse of microbiological laboratory services and absence of policies on antimicrobial use and above all poor consulting period. The physician also prescribed NSAID, anti-ulcerative, vitamins and minerals widely seems to be unrelated to clinical conditions and symptoms.

Despite great effort our study has some limitations including the data collected over a period of only three months, the sample size was small and seasonal variation in illness was not taken into consideration as because they might have affected disease patterns and antibiotic use. Finally, the findings obtained cannot be generalised to the whole people of Bangladesh rather a representative one. This data can provide the justification and direction for future studies examining trends in disease occurrence, prescription patterns and therapeutic strategies for selected populations.

### CONCLUSION

Our results demonstrated that the prescription information was incomplete. The prescribing practices and drug use patterns were found to be irrational. In reality, there is no legislation exists in the country for assessing the competence of prescribing by medical practitioners. This study urges the physician to be more professional and careful during prescribing the drugs and effective strategies should be taken by the government of Bangladesh to support the judicious use of drugs. However, this study may be considered as an effort to improve the quality of service of health care system in Bangladesh.

### CONFLICT OF INTERESTS

The authors declare that they have no conflict of interests

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