

# A cross-sectional study on current prescription trends and errors in outpatient department of a Bangladeshi secondary care district hospital

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## Abstract

**Context:** The rational prescription leads to a healthy and good-quality life of a patient. Irrational, inappropriate, and unnecessary prescriptions are major therapeutic issues in Bangladesh, which can cause severe consequences.

**Aim:** This cross-sectional study was conducted to evaluate the prescription patterns and errors as well as to review the most frequently prescribed drug classes among outpatients at a secondary hospital in Pabna, a district of Bangladesh.

**Methods:** A total of 400 prescriptions were reviewed from March 2019 to May 2019. In this study, statistical data analysis was implemented by IBM SPSS Statistics V22 and data revealed in frequencies, mean, and percentage. Spearman's rank correlation coefficient was calculated to show the correlation between bivariate coded variables.

**Results:** The results revealed that majority of the prescription were prescribed for females (73.5%) where proton-pump inhibitors (PPIs), analgesics, vitamins, and single antibiotics were most frequently prescribed medicine for the female patients compared to male patients. Almost half of the collected prescription contained four medicines (47%). Maximum number of prescriptions contained two (30.5%) essential drugs and among 1402 medicines of 400 prescriptions, antiulcerants were most frequently prescribed medicine (23.32%) where esomeprazole was highly prescribed generic drug (44.75%). Moreover, Spearman's rank correlation coefficient suggested that PPIs and analgesics were frequently prescribed medicines at a time for the patients (0.182). According to the age group, the study also got some significant variations in prescribing pattern. However, most common prescription errors were prescriber's name not mentioned (100%), diagnosis not mentioned (96.75%), dose not indicated (15.41%), and wrong drug name (0.36%).

**Conclusion:** Findings of the current study represent the existing prescribing trends of different therapeutic classes of drugs and common prescription errors in a secondary health facility of Bangladesh. From this study, it is observed that physicians prescribed rationally in some cases but need to ensure rationality in all prescriptions. Continuous monitoring of drug use, development of prescribing guidelines, and training are recommended to ensure and implement good-quality prescribing practices for promoting the rational and cost-effective use of drugs.

**Keywords:** Prescription errors, prescription pattern, rational drug use, secondary hospital

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## INTRODUCTION

Medicines play an important role in disease prevention and management.<sup>[1,2]</sup> Availability and correct use of medicines are very crucial aspect of patient care.<sup>[3]</sup> Efficient and effective health-care system truly depends on the rational prescription of drug by a licensed medical practitioner and proper dispensing and distribution of that prescribed drug.<sup>[1,2]</sup> Global morbidity and mortality can be reduced using appropriate and rational using of safe medicines.<sup>[4]</sup> An appropriate prescription has the remarkable influence on drug therapy and patient health.<sup>[2]</sup> However, irrational and inappropriate use of drugs is a global problem of the health-care system nowadays resulting in different health threats such as increased incidences like drug–drug interactions, adverse side effects, and antibiotic resistance.<sup>[5,6]</sup> According to the WHO, more than 50% of all patients fail to take their prescribed or dispensed medicines appropriately, and half of all medicines are improperly prescribed, dispensed, and sold.<sup>[4,5]</sup> Inappropriate prescribing practices is more prevalent in developing countries due to lack of regulation, guidelines, proper training, and monitoring.<sup>[6]</sup> The lack of adequate therapeutic training, drug knowledge and experience of physicians, improper guidelines, patient's inadequate or no communication with physicians, self-medication, and polypharmacy increase irrational use of drug.<sup>[2]</sup> Irrational and excessive prescribing causes unwanted clinical results like unsafe treatment, prolong illness or slow recovery, elevation of the risk of toxicities, and enhancement of adverse drug–drug reaction and increases antibiotic resistance.<sup>[7,8]</sup> Inappropriate and incorrect use of medicines in elder and pediatric patients associated with many problems and adverse drug reactions.<sup>[9]</sup>

Antimicrobial drug resistance is a worldwide concern for public health in both developed and developing countries.<sup>[10]</sup> Most antibiotics are prescribed empirically; there is no or little culture sensitivity test before antibiotic prescribing.<sup>[11,12]</sup> In developing countries like Bangladesh, 55.57% antibiotics are prescribed for suspected case, 33.46% are for the confirmed case, 40.22% are prescribed in cold and fever without diagnostic test, and 37.31% are prescribed for pleasing the patients.<sup>[13]</sup> Prescription errors also cause health care less or ineffective and nearly four errors per prescription were found in a survey that was conducted at a tertiary hospital in Bangladesh.<sup>[14]</sup>

Most of the studies previously have been performed on prescription surveys reported prescription errors, irrational use of drugs, incomplete information and overuse of antibiotics, analgesics, etc.<sup>[14–18]</sup> However, those studies

mainly focused on urban areas or tertiary level hospitals which usually does not provide proper information about district-level hospitals of Bangladesh. Periodic monitoring and evaluation of prescription pattern is a tool for facilitating rational use of medicines.<sup>[5]</sup> Hence, the main objective of this study was to evaluate the prescription patterns of a Bangladeshi secondary hospital to give a precise idea about the sociodemographic variations of patients as well as prescribing frequency of different therapeutic classes of drugs. Moreover, this study will also provide a clear picture of the current situation of prescription errors which can be occurred during the consultation of physicians with patients. Besides, information whether antibiotics, analgesics, and vitamins are being prescribed rationally or irrationally will also be evaluated. These valuable outcomes from the study may assist the policymakers to develop and update health-care policy along with effective prescription drug monitoring strategies with the aim to ensure optimal and cost-effective use of drugs which will enhance the quality of rural health-care sectors in Bangladesh.

## METHODS

### Study design and data collection

This cross-sectional study was conducted at the outpatient department in a secondary care hospital in Pabna, a district of Bangladesh. A systematic random sampling technique was utilized from March 2019 to May 2019 to collect prescriptions. A total of 400 prescriptions were collected. The data collector was waiting in front of the outpatient department and prescriptions' image was captured from the outpatients by randomly selecting the patients. The study was performed following the principles of the WMA Declaration of Helsinki (section 12). Written consent was obtained from each patient during the collection of prescription.

### Study measures

After collecting the prescriptions, sociodemographic characteristics such as age, gender, diagnosis, and the treatment mentioned in the prescription were noted carefully and analyses were performed. The age variable was divided into groups such as child (0–14 years), young (15–24 years), adult (25–40 years), senior adult (41–60 years), and older (above 60 years).<sup>[19]</sup>

### Statistical analysis

All of the necessary data were manually entered into Microsoft Excel 2007 (USA) for data analysis. Statistical Package for the Social Sciences (IBM SPSS Statistics V22, USA) was used for the statistical data analysis. The collected prescriptions data and information of this

cross-sectional study were presented in frequencies, mean and percentage of medicines, number of essential drugs (EDs) as well as number of therapeutic class of drug prescribed per prescription etc. Moreover, prescription pattern of different medicines according to the gender, age, and therapeutic group was assessed. Spearman's rank correlation coefficient was calculated to show the correlation between two coded variables. Here, the correlation coefficient for proton-pump inhibitors (PPIs) with other medicines was determined.

In this study, different types of prescribing errors were also checked. Based on the WHO good prescription guidelines, the prescription error parameters were set.<sup>[20-22]</sup> These errors were classified as omission errors which relate to the prescriber (prescriber full name, prescriber signature, patient's full name, age, prescriber address/phone number, registration number, patient visited department, and diagnosis), omission errors that relates to drugs (including dose, frequency, generic name, route, dosage form, medicine intake instruction, and medicine quantity to supply), and commission errors including incorrect drug name not spelling, wrong drug dosage form, wrong strength, and drug–drug interaction.<sup>[3,21-23]</sup>

## RESULTS AND DISCUSSION

A total of 400 prescriptions were evaluated in this survey [Table 1]. The majority of the prescriptions (73.5%) were prescribed for females and maximum patients were between the age groups of 25–40 years (47.5%). Among the rest, those aged between 41 and 60 years were 19.5% (78) and 2.5% (10) patients were above 60 years [Table 1], which means during this survey time, more female and adult patients were suffering from various diseases. The pediatric patients were comparatively higher than the young patients [17.3% vs. 13.3%].

Of 400 prescriptions evaluated, almost half of the prescription contained four medicines (47%) and nearly 44% have three drugs [Table 2]. No prescription was found containing one drug. The maximum of five medicines (4.3%) were prescribed in 17 prescriptions. Prescription of large number of medicines creates a financial burden and increases the chances of adverse effects like drug–drug interaction, side effects, noncompliance by patients; enhances bacterial resistance; and increases chance of prescription errors.<sup>[2,23]</sup>

A total of 66 prescriptions (16.5%) had no ED. Maximum number of prescriptions contained two (30.5%) EDs and their frequency was 122 among 400 prescriptions [Table 3]. Maximum five essential medicines were prescribed only in

a single prescription (0.3%). EDs offer low-cost treatment and less dispensing errors.<sup>[7]</sup>

A total of 1402 medicines were prescribed in 400 prescriptions. As per the analysis, the highest percentage of prescribed medicines was antiulcerants (23.32%), followed by analgesics (20.76%), minerals (11.41%), vitamins (9.99%), and single antibiotic (9.91%) of total 1402 drugs. Other commonly prescribed medicines were antihistamines, antispasmodics,

**Table 1: Socio-demographic characteristics of sample patients**

Characteristics	Frequency (%)
Gender	
Female	294 (73.5)
Male	106 (26.5)
Age group	
0–14 (child)	69 (17.3)
15–24 (young)	53 (13.3)
25–40 (adult)	190 (47.5)
41–60 (senior adult)	78 (19.5)
>60 (older)	10 (2.5)

**Table 2: Number of medicines prescribed per prescription**

Number of medicine per prescription	Frequency (%)
1	0 (0)
2	20 (5.0)
3	175 (43.8)
4	188 (47.0)
5	17 (4.3)

**Table 3: Number of essential drugs prescribed per prescription**

Number of ED per prescription	Frequency (%)
0	66 (16.5)
1	115 (28.7)
2	122 (30.5)
3	84 (21.0)
4	12 (3.0)
5	1 (0.3)

ED= Essential drugs

**Table 4: Therapeutic classes of drug prescribed**

Therapeutic class	Number of drugs (%)
Antiulcerants	327 (23.32)
Analgesics	291 (20.76)
Minerals	160 (11.41)
Vitamins	140 (9.99)
Single antibiotics	139 (9.91)
Antihistamines	66 (4.71)
Antispasmodic	34 (2.43)
Antitussive and expectorant	33 (2.35)
Combination antibiotics	32 (2.28)
Antiemetics	31 (2.21)
Bronchodilator	30 (2.14)
Antidiarrheal	26 (1.85)
Antiprotozoal	19 (1.36)
Antidepressants	12 (0.86)
Antiepileptic	7 (0.5)
Antihypertensives	7 (0.5)
Miscellaneous drugs	48 (3.42)
Total	1402 (100)

antitussive and expectorant, combination antibiotics, antiemetics, bronchodilator, antidiarrheal, and antiprotozoal [Table 4].

Of 1402 medicines prescribed in 400 prescriptions, PPIs, analgesics, vitamins, and single antibiotics were most frequently prescribed medicine for the female patients (i.e., 52%, 51.5%, 30%, and 22%, respectively) compared to male patients. Besides, combination antibiotics were most frequently prescribed medicine among the male patients (4.25%) compared to female patients (3.75%). However, antihypertensive drugs were prescribed equally for both the categories of patients [Table 5].

According to the analysis, most frequently prescribed PPI, single antibiotics, combination antibiotics, and antidiarrheal were among the adult patients (i.e., 38.75%, 13.5%, 2.25%, and 2.75%, respectively) compared to other age group patients. Besides, analgesics and antihypertensives were most frequently prescribed among the senior adults (34.5% and 0.75%, respectively). Combination antibiotics were frequently prescribed among young and adult patients (2.25%). However, most commonly prescribed medicines among children were single antibiotics (10.25%), among young patients were PPI and analgesics (10.5% in both cases), and among older patients were also PPI [2%; Table 6].

Among therapeutic classes, esomeprazole was the mostly prescribed medicine [44.75%; Table 7]. High level of antiulcerants prescribing reflects that people suffer from more peptic ulcer syndrome, heartburn, gastroesophageal reflux diseases, *Helicobacter pylori* infection, and others such as gastroesophageal syndromes. Among antiulcer drugs, PPIs were highly prescribed in case of female (52%, [208]) and 17.25% (69) for

male [Table 7]. PPIs prescribed for children 1.75% were comparatively low. However, prolong wrong use of PPIs can create serious adverse outcomes instead of benefits such as gastrointestinal bleeding, nutritional shortage, and rebound acid hypersecretion.<sup>[2,24]</sup> The changes of lifestyle and use of H<sub>2</sub> blockers could show effective result than PPIs, it is an alternative way to reduce drug burden and adverse effects.<sup>[2,25]</sup> Analgesics occupied top second position among the therapeutic class in this study, among which paracetamol was mostly prescribed [32%; Table 7]. Inappropriate and overuse of anti-inflammatory analgesics causes gastrointestinal tract (GIT), renal, and cardiac disorders.<sup>[2]</sup>

Vitamins and mineral supplements enhance healing process in case of malnutritional and elderly patients where the dietary pattern is inadequate.<sup>[6]</sup> However, sometimes, prescribers prescribe vitamins and mineral supplements as placebo where no indications are available for its requirement, which is irrational and causes financial burden.<sup>[1,6]</sup> In this study, calcium and Vitamin D3 were mostly prescribed among the therapeutic class of vitamin and mineral [Table 7].

It was observed that the most commonly prescribed single antibiotic was ciprofloxacin (6%, 24) and antibiotic combinations were cefuroxime with clavulanic acid (7.5%, 30) [Table 7]. These combination therapies were prescribed as empirical therapy for polymicrobial and critical infections.<sup>[3]</sup> Most of the antibiotics were prescribed without culture sensitivity testing. However, prescribing nonevidence-based antibiotics may create the chance of antibiotic resistance.<sup>[12,26]</sup> Most of the prescriptions did not mention any indications, for which antibiotic therapies were prescribed.

**Table 5: Prescription pattern of different medicines according to the gender**

Gender	Frequency (%)					
	PPI (%)	Analgesics (%)	Single antibiotics (%)	Combination antibiotics (%)	Antihypertensives (%)	Vitamins (%)
Female	208 (52)	206 (51.5)	88 (22)	15 (3.75)	3 (0.75)	120 (30)
Male	69 (17.25)	69 (17.25)	47 (11.75)	17 (4.25)	3 (0.75)	17 (4.25)

PPI=Proton-pump inhibitors

**Table 6: Prescription pattern of different medicines according to the age group**

Age group	Frequency and percentage					
	PPI (%)	Analgesics (%)	Single antibiotics (%)	Combination antibiotics (%)	Antihypertensives (%)	Antidiarrheal (%)
0–14 (child)	7 (1.75)	36 (9)	41 (10.25)	8 (2)	2 (0.5)	8 (2)
15–24 (young)	42 (10.5)	42 (10.5)	13 (3.25)	9 (2.25)	0 (0)	3 (0.75)
25–40 (adult)	155 (38.75)	137 (32.25)	54 (13.5)	9 (2.25)	0 (0)	11 (2.75)
41–60 (senior adult)	65 (16.25)	54 (34.5)	25 (6.25)	6 (1.5)	3 (0.75)	2 (0.5)
>60 (older)	8 (2)	6 (1.5)	2 (0.5)	0 (0)	1 (0.25)	2 (0.5)

PPI=Proton-pump inhibitors

The prevalence of antihypertensive drug prescription in this study was comparatively low. Amlodipine was the most prescribed medicine among the therapeutic class of antihypertensive [Table 7]. Besides, among 1402 medicines from 400 surveyed prescription, tablet dosage forms occupied the highest position 1115 (79.53%), followed by capsule, syrup, injection, and others such as inhaler, nasal or ear drops, spray, and topical dosage form [Figure 1].

Most of the cases doctor prescribe more than one medicine in a prescription where PPI is the most common medicine prescribed with other medicines. Hence, the analysis was done to find which medicines were prescribed most with PPI. As PPI shows better correlation with other medicines, Spearman's rank correlation was used to find the correlation of PPIs with other medicines.<sup>[27]</sup> Two-tailed tests were done to analyze the significance where values of  $P < 0.05$  were considered as significant. According to the analysis based on 400 prescriptions, PPI showed positive correlation with analgesic, antispasmodics, antidiarrheal, antiemetics, vitamins, minerals, combination antibiotics, and negative correlation with rest of the medicines [Table 8]. Among all of the combinations, PPI showed the highest positive correlation with analgesic (0.182) and highest negative correlation with bronchodilator (-0.195), which means most of the prescription showed that PPIs and analgesic were prescribed at a time for the patients [Table 8].

Considering the patient's details on prescription, none of the prescription contained prescriber name and prescriber signature was missed in case of 0.12% prescription. The diagnosis was missed in case of 96.75% prescriptions. The mention of diagnosis is crucial for proper treatment and to ensure rational use of medicines.<sup>[2]</sup> If the diagnosis is incorrect or prescribing medicines without diagnosis, patients cannot get proper treatment. Recording diagnosis illustrates the precision and self-reliance of the prescriber and gives conception to the drug dispenser and the patients about the disease condition are being treated.<sup>[4]</sup> However, the dose of medicine did not mention in case of 15.41% prescriptions [Table 9]. Such type of error can create confusion among retailer pharmacy and

the patients; as a result, optimum treatment becomes failed if they chose wrong strength.

Prescription patterns of different tertiary care hospitals in urban areas of Bangladesh were reported previously, but those studies did not represent the prescribing pattern in a secondary hospital.<sup>[14-18]</sup> After vigorous literature survey, it was found that this study reported first time the prescription pattern and errors in a district hospital as well as the frequency of different therapeutics classes of drugs according to the patient's age and gender. Moreover, Spearman's rank parametric bivariate correlation coefficient was also determined to find the correlation of PPIs with other medicines.

Over 90% prescription contained three or more drugs which were higher than the ideal WHO standard (1.6-1.8), and similar average number of medicines per prescription was reported by Alam *et al.* and Afsan *et al.* for tertiary hospitals.<sup>[16,17,28]</sup> This current study revealed that esomeprazole, paracetamol and ciprofloxacin were found most commonly prescribed antiulcerants, EDs and single antibiotics, respectively, and PPIs were the most frequently prescribed medicine. Among combination

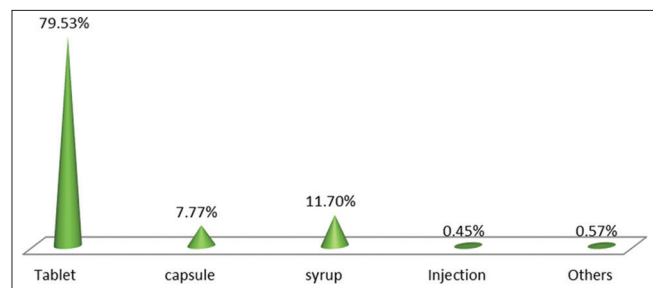
**Table 7: Most prescribed medicine according to the therapeutic group and their generic name**

Therapeutic group	Generic name	Frequency (%)
Antiulcerants	Esomeprazole	179 (44.75)
Vitamin and minerals	Calcium+Vitamin D3	141 (35.25)
Analgesics	Paracetamol	128 (32)
Vitamins	Vitamin B1, B6, B12	92 (23)
Combination antibiotics	Cefuroxime + Clavulanic acid	30 (7.5)
Single antibiotics	Ciprofloxacin	24 (6)
Antiemetics	Domperidone	24 (6)
Antidiarrheal	Tiemonium methyl sulphate	22 (5.5)
Antihypertensives	Amlodipine	2 (0.5)

**Table 8: Determination of Spearman's rank correlation coefficient for proton-pump inhibitors with other medicines**

Combination	Correlation coefficient
PPI-analgesic	0.182
PPI-antispasmodics	0.111
PPI-antidiarrheal	0.037
PPI-antiemetics	0.029
PPI-vitamins	0.024
PPI-minerals	0.021
PPI-combination antibiotics	0.01
PPI-antidepressants	-0.003
PPI-antihypertensive	-0.008
PPI-antiepileptic	-0.091
PPI-antiprotozoal	-0.095
PPI-antitussive and expectorant	-0.114
PPI-single antibiotics	-0.188
PPI-bronchodilator	-0.195

PPI: Proton-pump inhibitors



**Figure 1: Prescribing pattern of different types of dosage form**

**Table 9: Different types of prescribing errors**<sup>[3,21-23]</sup>

Errors	Number of errors* (%)	Average error per prescription <sup>#</sup>
Errors of omission associated with prescriber (n=400) <sup>[3,21-23]</sup>		
Patient's full name not mentioned	0 (0)	0
Age not mentioned	0 (0)	0
Prescription date not mentioned	0 (0)	0
Prescriber name not mentioned	400 (100)	1
Prescriber signature not mentioned	50 (12.5)	0.12
Diagnosis not mentioned	387 (96.75)	0.97
Prescriber address/phone number not mentioned	320 (80)	0.8
Registration number not mentioned	19 (4.75)	0.0475
Total error	1176	2.9375
Errors of omission linked to total medicine (n=1402) and per prescription (n=400) <sup>[3,21-23]</sup>		
Strength not mentioned	216 (15.41)	0.54
Frequency not mentioned	0 (0)	0
Dosage form not mentioned	0 (0)	0
Quantity to supply not mentioned	0 (0)	0
Generic name not used	738 (52.64)	1.845
“Drug before meal” not mentioned <sup>@</sup>	205 (14.62)	0.51
Total errors	1159	2.8975
Errors of commission per total medicines prescribed (n=1402) and per prescription (n=400) <sup>[3,21-23]</sup>		
Incorrect strength	0	0
Wrong drug name (not spelling)	5 (0.36)	0.01
Wrong dosage form	0 (0)	0
Total error	5	0.01

\*Error/total number of prescriptions) × 100, #error/total number of prescriptions. \*Usually, drugs are taken after meal, The drugs which are indicated before meal, if prescriber does not specify or mention it in prescription, then it considered prescription error. n=Total prescription collected and n=Total medicines prescribed

antibiotic therapies, cefuroxime and clavulanic acid combination was mostly prescribed. Antibiotics were provided without performing any culture sensitivity test or proper diagnosis. Few studies previously reported that omeprazole and esomeprazole were the highest prescribed PPIs and among the cephalosporin, quinolones, and macrolides, most frequently used antibiotics in Bangladesh were cefuroxime, ciprofloxacin, and azithromycin, respectively.<sup>[29-32]</sup> However, these drugs would be prescribed when their clear indication observed and prescribe more judiciously.<sup>[29-32]</sup> First-line therapy of fluoroquinolones such as ciprofloxacin is not recommended for children due to its cartilage side effect profile; however, current survey and previous studies found that physicians prescribed this medication for child patients in Bangladesh as well as other developing countries regularly.<sup>[33,34]</sup> Although the FDA has approved ciprofloxacin for certain indications, for example, urinary tract infections, GIT infections, and pyelonephritis in children, prescriber should prescribe carefully after assessing risk and benefits.<sup>[33,34]</sup>

## CONCLUSION

Irrational prescription leads to different serious health problems. This study analyzed the current prescription trends and errors for outpatients in a district hospital of Bangladesh. An average number of medicines per

prescription was greater than the WHO guidelines which is alarming, and the EDs were not included much in those prescriptions. Moreover, several prescription errors were found. Antibiotics, analgesics, PPIs, and vitamins should be prescribed judiciously according to the national and international guidelines to minimize side effects and financial burden. In addition, writing of medicine's generic name in prescription needs to be encouraged and promoted. Findings of this survey will be supportive for the policymaker to formulate strategies and take appropriate measures to upgrade the quality of prescriber's prescription to lessen the drugs burden, unwanted side effects, drug resistance, and drug–drug interactions which will ensure appropriate and safe medicine for all patients.

## Limitation of the study

This study, however, is subject to several limitations. The study was conducted only among outpatients of a hospital. Moreover, the period of this prescription survey and the size of the sample of the current study was also not so large. Besides, medicines' usage in case of inpatient departments was not included. Hence, the study may not correctly indicate the overall drug utilization pattern of the hospital.

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Nil.

## Conflicts of interest

All authors contributed equally to this work.

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