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Prescribing Pattern and Prescription Errors: A Study at a Tertiary Care Hospital of Bangladesh

Farzana Sultana[1], Ajijur Rahman[1],Tripti Rani Paul[2], Md. Shahid Sarwar[3], Md. Anwar Ul Islam[1] and Mamunur Rashid[3]

[1]Department of Pharmacy, Rajshahi University, Rajshahi-6205, Bangladesh
[2]Department of Pharmacy, Khwaja Yunus Ali University, Sirajganj-6751, Bangladesh
[3]Department of Pharmacy, Southeast University, Dhaka-1213, Bangladesh

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Abstract

Irrational prescribing of drugs is a major health concern in developing countries like Bangladesh. A study was therefore undertaken in a hospital, situated in Rajshahi region of Bangladesh, to find the prescribing pattern and to detect the prescription errors to the admitted patients. Prescriptions of 200 patients were collected from various departments of the hospital over a period of three months. Prescription pattern was analyzed using general indicators suggested by WHO and prescribing errors were determined by comparing the prescribed drugs with national standard treatment guidelines, textbooks and authentic online resources. The average number of drugs per prescription was found to be 4.89 and 76.5% prescriptions contained complex regimen. In this study, we found no prescription with generic name. The percentage of prescription with antibiotics was 78% that was 15.95% of total drugs. The injectable preparations used were 17.18% of total 978 drugs. About 769 (3.85 per prescription) prescription errors were identified from 978 prescribed drugs. The name of 35 prescribed drugs was not clear due to illegible hand writing. The dose strength was missing for 279 drugs and 31 drugs had improper abbreviation. The study also identified 409 drug interactions. About 6.5% prescription orders were identified for the patients with kidney and urinary problems and there was no dose adjustment. Frequency of occurrence of prescription errors found during the study can be rated high. The prescription pattern and the prescription errors have indicated the need to establish proper system of recording and analyzing therapy before writing a prescription in order to promote rational drug therapy.

Key words: Rational drug therapy, Prescribing pattern, Prescription error, Polypharmacy, Generic name.

Introduction

Drug utilization study as defined by the WHO, is 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 upon criteria and standards, with special emphasis on the resulting medical, social, and economic consequences (Jimoh *et al.*, 2011). Drug utilization studies seek to monitor, evaluate and suggest modifications in the prescribing practices with the aim of making the medical care rational and cost effective (Jimoh *et al.*, 2011). A study of prescription pattern is an important tool to determine rational drug therapy, maximize utilization of resources and to reduce prescription errors. In 2008, the world health organization (WHO) reported that more than half of all medicines are prescribed dispensed or sold (Silva, 2009) inappropriately and that half of all patients fail to take them correctly.

Prescription errors are an unfortunate reality at hospitals. Approximately, 30% of problems occurring during hospitalization are related to medication errors (Silva, 2009). Errors are possible at any step of the care process, from medication selection to drug administration. Numerous studies have shown that patients admitted to hospitals are harmed as a result of medication errors, majority of which are due to the errors in prescriptions (Leape *et al.*, 1995; Barber *et al*., 1998; Pote *et al*., 2007).

A clinically meaningful prescription error occurs when, as a result of a prescribing decision or prescription

Correspondence to: Mamunur Rashid; E-mail: mamun69jp@yahoo.com

writing process, there is an unintentional significant reduction in the probability of treatment being timely and effective or increase in the risk of harm when compared with generally accepted practice (Dean *et al*., 2000). The medication errors are more common because of polypharmacy. The majority of errors are not only due to reckless behavior on the part of health care providers, but also occurs as a result of the speed and complexity of the medication use cycle, combined with faulty systems, processes and conditions that lead people to make mistakes or fail to prevent them (Barker *et al*., 2002; Moyen *et al*., 2008). Bates *et al.* (1995) reported that 56% of adverse drug events occurred during the prescribing stage and 34% during the administration stage; only 4% occurred at the dispensing stage.

National Drug policy (NDP, 2005) states that only registered drugs should be allowed to distribute and sell throughout the country under person having professional qualification and holding professional license. NDP (2005) again indicates that no drugs other than OTC should be sold or dispensed without prescriptions. Rational use of drugs (RUD) should be ensured by conducting survey on the system of prescribing, dispensing and patient compliance. Monitoring and reporting adverse drug reactions should be done seriously to ensure safe and rational use of drugs in the country.

To improve the overall drug use, especially in developing countries, international agencies like the world health organization (WHO) and the international network for the rational use of drugs (INRUD) have engaged themselves to evolve standard drug use indicators (Biswas *et al*., 2001). These indicators help us to improve our performance during different time periods (Yeasmeen *et al*., 2011). The rational prescribing skills of clinicians can be assessed by conducting periodic prescription audits. In a teaching hospital as the medical teachers are the role models for the students, the prescribing behavior of the teachers can affect the students. These audits and studies can also influence the policy makers by informing them about the quality of drug use in the health facility (Desai, 2001; Bimo *et al*., 1999).

There is an urgent need to ensure that patients are always given evidence-based, cost-effective and rational treatments. Gaining insight into physician's pattern in order to identify prescribing problem is the fundamental step in improving the quality of prescription and patient care. Therefore, the present study was planned to understand the prescription pattern of inpatients in a government hospital of Bangladesh and to detect the incidence of prescribing errors for admitted patients.

Methods

Study area and data collection process: A cross-sectional study was conducted to the inpatients in a 1000 bed teaching hospital, Rajshahi, Bangladesh. This is a Government hospital and serves as a central provider for advanced health care in the northern part of Bangladesh. Prescriptions were randomly collected from inpatients department of the participating units during winter season (October to December 2011). A total of 200 patients were selected after 24 hours of admission and the patients who were under the supervision of responsible physician. All the data for the analysis extracted from the patient's case note, treatment chart and by interviewing patients into a data collection form.

Study parameters: General prescription pattern: Each individual indicator was analyzed by using the following drug indicators suggested by the WHO (Biswas *et al*., 2001) to evaluate the drug prescription pattern:

a. Total number of drugs in the prescription
b. Average number of drugs per prescription.
c. Percentage of drugs prescribed by generic name.
d. Percentage of prescriptions with antimicrobials prescribed.
e. Percentage of prescriptions with inject able preparations
f. Whether the dosage of the drugs prescribed is appropriate.

Categories of prescription errors: A clinically meaningful prescribing error occurs as a result of a prescribing decision or prescription writing process as mentioned below:

Errors in prescribing writing process

- Absence of drug information
- Use of inaccurate abbreviation
- Illegible hand writing
- Errors in decision process/decision errors
- Drug interaction
- Therapeutic duplication

Data analysis process: The data includes demographic variables, date, name of medication, dosage forms, doses and frequency. Data were edited, coded and entered into SPSS (Statistical package for social service) version 15. All drugs were classified according to the Anatomical Therapeutic Classification System (ATC) recommended by the World Health Organization (WHO). The drug-drug interactions were checked using Medscape drug interaction checker. Prescribing errors were assesses by comparing the prescribed drugs with national standard treatment guidelines, textbooks and software. Descriptive statistics like frequency and other parameters were computed to determine the overall prevalence of prescribing errors. The whole procedure was completed with consent of authorities of the concerned institutions and confidentiality of the prescriptions was maintained strictly.

Results and Discussion

A total of 200 patient's prescription files were studied. The majority of the patients were male 112 (56%) and 88 (44%) patients were female with 73.5% of them aged between 18-60 years. Among these patients, 17.5% and 37.5% were illiterate and from primary education level, respectively and 70 (35%) had previous records of hospitalization (Table 1). According to the study, the frequency of prescribing errors was 769 (3.85 per patient) (Figure 1).

Table 1. Characteristics of patients admitted to the hospital.

Variables	Characteristics	Frequency
Age	≤ 17 years	19 (9.5%)
	18- 60 years	147 (73.5%)
	> 60 years	34 (17%)
Gender	Male	112 (56%)
	Female	88 (44%)
Educational level	Uneducated	35 (17.5%)
	Primary	75 (37.5%)
	Secondary	65 (32.5%)
Length of stay	1-5 days	100 (50%)
	6-15 days	77 (38.5%)
	>15 days	23 (11.5%)
Regimen taken	Complex	153 (76.5%)
	Not complex	47 (23.5%)

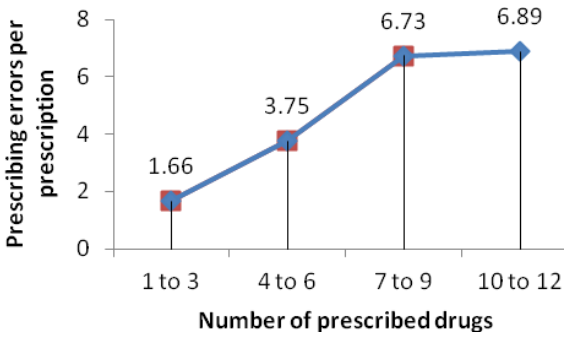

Figure 1. Frequency of errors in the prescriptions.

Prescription pattern

In the study, a total of 978 drugs were prescribed to 200 patients with an average of 4.89 drugs per prescription. It was more than that reported in most of the studies conducted in government setups across Indian cities, the closest being Delhi 3.03 (Biswas *et al*., 2001). International studies report values ranging from 1.3 in Zimbabwe (Hogerzeil *et al*., 1993) to 4.51 in Pakistan (Das *et al*., 2001). A staggering 76.5% of prescriptions had 4 or more drugs revealed a trend of polypharmacy.

The use of generic preparations was found to be much in vogue. No drugs were prescribed by their generic names in this study. It is important to note that drugs should be prescribed in their generic names to avoid confusion. Although there are both advantages and disadvantages of generic prescribing, there is more to gain than to lose by this practice, especially in a teaching hospital which has a dual responsibility of providing patient service as well as medical education.

The percentage of prescriptions with antibiotics was 78%. According to WHO 15-25% of prescriptions with antibiotics are expected in most of the developing countries, where infectious diseases are more prevalent (Lamichhane *et al*., 2006). This figure is very high in comparison to some of the developing countries. Various studies from India also report a high rate ranging from 40-80% (Kumari *et al*., 2008).

Drugs for acid-related disorders (204, 20.86%) were the most frequently prescribed drugs followed by anti-bacterial agents for systemic use, analgesics, anti-inflammatory and anti-rheumatic products and vitamins and minerals were 156 (15.95%), 73 (7.46%), 54 (5.52%) and 47 (4.8%), respectively. Table 2 shows drug use

indicators found from our study. More than half of the drugs 591 (60.43%) belonged to tablet dosage form and 168 (17.18%) drugs were injectable preparations (Table 2).

Table 2. Pattern of WHO core drug use indicators.

Characteristics	Value
Total number of prescriptions	200
Total number of drugs prescribed	978
Average number of drugs per prescription	4.89
% of drugs prescribed by generic name	0
% of prescriptions containing antimicrobial agents	156 (15.95%)
% of prescriptions with drugs for acid related disorders	204 (20.86%)
% of prescriptions with inject able preparations	168 (17.18%)
Percentage of prescriptions with tablet dosage form	591 (60.43%)

Prescription errors

A wide range of different types of errors associated with handwritten prescription orders in the teaching hospital were found in the present study. These orders were intended by the physicians for admitted patients having one medical problem or more. From a total of 200 medication orders, 769 prescribing errors were detected representing 3.85 errors per prescription. In this study, errors in the prescription writing process were found to be 345 representing 44.86% of total errors and decision errors were found to be 424 representing 55.14% of the total errors (Table 3).

Table 3. Different types of prescribing errors.

Errors in prescription writing process (n=345)	
Type of errors	Frequency (%)
Absence of strength of medicine(s)	279 (36.28%)
Illegible hand written medicine(s)	35 (4.55%)
Improper abbreviation	31 (4.03%)
Errors in prescription for decision (n=424)	
Drug interactions	409 (53.19%)
Therapeutic duplication	15 (1.95%)

Table 4. Strength of medicines was not stated where a medicine is present in various strength.

Drugs	Strength present in the market
1. Diclofenac suppository	12.5 mg, 50 mg
2. Ketorolac injection	10 mg/ml, 30 mg/ml, 60 mg/2ml
3. Ceftriaxone injection	1 gm/vial, 250 mg, 500 mg, 2 gm/vial
4. Pantoprazole tablet	20 mg, 40 mg
5. Paracetamol suppository	125 mg, 250 mg, 500 mg
6. Cefuroxime injection	250 mg/vial, 750 mg/vial, 1.5 gm/vial
7. Amoxicillin injection	250 mg/vial, 500 mg/vial

As shown in the present study, the most common prescription errors out of 978 prescribed medicines were in the name of 35 prescribed drugs, which were not clear due to ambiguous hand writing, strength of medicines were not mentioned in case of 279 drugs whereas these drugs were present in the market in various strengths (Table 4). This study also identified 31 improper abbreviations and 15 prescriptions containing therapeutic duplication. This frequency was low but may cause serious problem because in most of the cases they are known to produce drug- drug interaction. A total of 409 drug interactions were also identified from 200 prescriptions. A previous study in Southeast Ethiopia disclosed the absence of drug information was 23.8% and improper abbreviation was 2.3% in southwest Ethiopia (Agalu *et al.*, 2011).

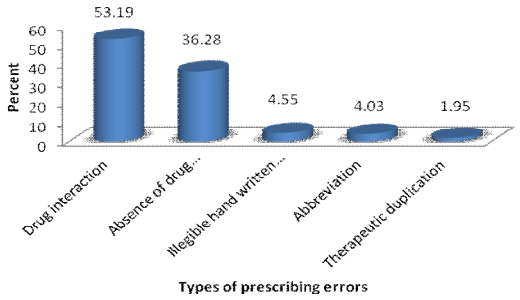

Figure 2. Different types of prescription errors.

Finally, it must be noted that this study did not explore the severity of errors, outcome of treatment or reasons for errors. The use of guidelines rather than clinical opinions to determine error, and the small number of patients included in the study must also be noted.

Conclusion

In conclusion, the prescribing practices observed in this study were found to be un-satisfactory, as suggested by polypharmacy and over prescription of antibiotics. The errors reported clearly show that there are multiple causes for prescribing errors. Medication errors at the prescribing phase were highly prevalent for the inpatients in the studied hospital. With the increasing complexity of care in critically ill patients, organizational factors such as the absence of quality assurance measures, error reporting systems, and routine checks could have contributed to the errors reported here. The lack of close supervision for the prescribing medical interns, along with the absence of the clinical pharmacists, could have made things worse. Hospital managers should strive to create better awareness about the possibility of medication errors at the prescribing phase among health care professionals. Introduction of quality assurance measures and routine checks with close supervision of the prescribing intern physicians are strongly recommended. We also recommend the inclusion of the clinical pharmacists in the health care team of the hospital in general.

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