

**ORIGINAL RESEARCH ARTICLE****PRESCRIPTION ERRORS AND PHARMACIST INTERVENTION AT OUTPATIENT PHARMACY OF CHITWAN MEDICAL COLLEGE**RS Poudel^{1*}, RM Piyani¹, S Shrestha², A Prajapati¹, B Adhikari¹¹Chitwan Medical College and Teaching Hospital, Bharatpur, Chitwan, Nepal²Shree Medical and Technical College, Bharatpur, Chitwan, Nepal.

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ABSTRACT

Prescribing errors are harmful to the patients. The role of pharmacist in reducing potential harm from prescription errors have been highlighted by several studies. This study aimed to evaluate the drug related prescription error and pharmacist intervention at outpatient pharmacy of Chitwan Medical College Teaching Hospital. A cross-sectional study was conducted in the outpatient Pharmacy of Chitwan Medical College Teaching Hospital from November 2014 to December 2014. The outpatient pharmacist randomly selected 5000 prescription and checked for drug related prescription error using prescription error checklist. The pharmacist discussed the prescription errors with the prescriber. The prescriptions that were corrected by the prescribers were considered as pharmacist intervened prescriptions (pharmacist intervention). Descriptive statistics including Chi-square test were done for statistical analysis using IBM-SPSS version 20. Out of 5000 prescriptions 176 drug related prescription error was found. The commonest error was dose and dosing frequency error (39.2%), duplication (33.5%) and dosage form related error (19.3%). Most of the prescription errors were noted while prescribing antimicrobial drugs (27.8%), proton pump inhibitors (15.9%) and NSAIDs (12.5%). The pharmacist's recommendation was accepted by prescriber in 90.3% of prescription. Chi-square test showed significant association ($p=0.019$) between prescription errors and pharmacist intervention. Pharmacist intervention can reduce the drug related prescription error, so the pharmacist and clinician need to strongly work together for reducing overall prescriptions error.

Key words: Drug error, Intervention, Pharmacist, Pharmacy, Prescription.

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INTRODUCTION

Prescription error is a failure in the prescription writing process leading to wrong instruction about identity of the recipient, the identity of the drug, the formulation, dose, route, timing, frequency, and duration of administration.¹ Studies have demonstrated the high missing of legal or procedural requirements in teaching hospital along with prescription errors such as duplication, wrong strength, wrong dosage form, wrong route, and drug-drug interactions which results in numerous drug related problems such as over-dosage, under-dosage, drugs interactions, drug allergy, and non-compliance.²⁻⁵ Prescribing errors may adversely affect outcomes and sometimes harmful to patients.^{6,7} Pharmacist interventional studies not only found to enhance the treatment effec-

tiveness and adherence but also reduce the cost of treatment and the potential harm from serious prescription errors.^{3,5,8} Furthermore, incorporation of pharmacist as a health care team member in direct patient care have shown favorable effects across various patient outcomes, health care settings, and disease states.⁹ Hence, the non-dispensing roles of pharmacist on patient outcomes and prescribing patterns have been increasingly highlighted.^{10,11} In spite of this, limited studies have been conducted about prescribing errors and usefulness of pharmacist's intervention. The present cross-sectional study was conducted to evaluate the drug related prescription error and pharmacist intervention at outpatient pharmacy of Chitwan Medical College.

MATERIAL AND METHODS

This hospital based cross-sectional study was conducted in the outpatient Pharmacy of Chitwan Medical College from Nov 2014 to Dec 2014 after obtaining ethical approval from Chitwan Medical College Institutional Review Committee (CMC-IRC). On average the outpatient pharmacy dispenses around 250-500 prescriptions per day, which may vary from season to season. A total of 5000 prescriptions written by clinicians (registered medical practitioners) were randomly collected and evaluated by the outpatient pharmacists. The randomly selected prescriptions were checked for dose and frequency error (dose error, frequency error and omission of dose), drug interaction, dosage form related error (breaking of enteric coated, controlled release, sustained release), inappropriate drug (the drug chosen inappropriately, for example contraindicated drug prescribing in pregnancy, hepatic disease, renal disease) and duplication using prescription error checklist. A copy of confirmed medication-prescribing errors detected by pharmacist was maintained in the outpatient pharmacy prior to discussion with clinicians. The detected prescription error was discussed with the prescriber and was confirmed as written, clarified, changed, or discontinued. The prescriptions that were corrected by the prescriber were considered as pharmacist intervened prescriptions (pharmacist intervention). Descriptive statistics including Chi-square test were performed for statistical analysis using SPSS version 20.

RESULTS

Out of 5000 prescriptions 176 drug related prescription errors were found. The commonest error was dose and dosing frequency error (39.2%), followed by duplication (33.5), dosage form related error (19.3%) and some degree of drug interaction (4.5%) and inappropriate drug (3.4%). Our result showed that more than one quarter (27.8%) of prescription error occurred in antimicrobial drugs, 15.9% in proton pump inhibitors, 12.5% in nonsteroidal anti-inflammatory drugs & antipyretic-analgesics, 6.3% in antidepressant drugs and 5.7% error was found while prescribing vitamins and minerals. The pharmacist intervention was successful in 90.3% of prescription (Table 1).

Table 1: Baseline characteristics (N=176).

Category		n (%)
Prescription errors	Dose & dosing frequency error	69(39.2)
	Duplication	59(33.5)
	Dosage form related error	34(19.3)
	Drug interaction	8(4.5)
	Inappropriate drug	6(3.4)
Drug category	Antimicrobial drugs	49(27.8)
	Anti Parkinsonian drugs	2(1.1)
	Antihistaminics	8(4.5)
	Antispasmodics	3(1.7)
	Antiepileptic drugs	5(2.8)
	Antihypertensive drugs	4(2.3)
	Laxatives	2(1.1)
	Antiemetics	1(0.6)
	Hormones & enzymes	4(2.3)
	Sedatives-hypnotics	2(1.1)
	Ulcer protectives	1(0.6)
	Proton pump inhibitors	28(15.9)
	Opioid analgesics	3(1.7)
	Antivertigo drugs	2(1.1)
	Central muscle relaxants	1(0.6)
	Antimanic drugs	1(0.6)
	Bronchodilator with anti-inflammatory	6(3.4)
	Vitamins & minerals	10(5.7)
	Nonsteroidal anti-inflammatory drugs & Antipyretic-Analgesics(NSAIDs)	22(12.5)
	Bronchodilators	2(1.1)
Antidepressant drugs	11(6.3)	
Antimigraine	1(0.6)	
Cough preparation	3(1.7)	
Decongestant	5(2.8)	
Pharmacist intervention	Yes	159(90.3)
	No	17(9.7)

There was significant association ($p=0.019$) between prescription errors and pharmacist intervention. (Table 2)

Table 2: Association between prescription error and Pharmacist intervention

Prescription error	Pharmacist intervention		P-value
	No	Yes	
Dose and frequency error	7(41.2)	62(39.0)	0.019*
Duplication	1(5.9)	58(36.5)	
Dosage form related error	7(41.2)	27(17)	
Drug interaction	2(11.8)	6(3.8)	
Inappropriate drug	0(0)	6(3.8)	

DISCUSSION

In our study, the prescription error was 3.52 percent. Studies have shown prescription error ranging from 1.5 to 8.4 percent.^{2, 12, 13} So, the rate of prescription error may vary in different clinical setting and health care facility. Dose and dosing frequency error, duplication and dosage form related error were commonest prescription error in our study. The dose and frequency error may result in under dosing or overdosing leading to unexpected outcomes. Most of studies have also shown dose and frequency error as most commonest error.^{3,4,12,13,14} However, some studies reported drug-drug interactions as the most frequently occurring type of error, followed by incorrect dosing interval and dosing errors.^{5,15} Therefore, the incidence of type of prescription error may vary in different setting. The duplication may increase the cost of treatment but more importantly adverse outcomes due to excess pharmacological effect. The dosage form related error may or may not influence the quality of outcomes depending on nature of error. Study by Lesar suggest inappropriate use of medication dosage forms increase risk for adverse outcomes.¹⁶

Our study revealed antimicrobial drugs, proton pump inhibitors, nonsteroidal anti-inflammatory drugs and antipyretic-analgesics, and antidepressant drugs are most commonly prescribed with errors. Other studies carried out in different countries, have also demonstrated antimicrobial agents as most commonly prescribed with errors.^{15,17,18} In contrast to present study, Al-Hajje et al demonstrate antiulcer agents, NSAIDs, antibiotics and steroidal agents are most frequently prescribed with errors.¹⁹

The pharmacist's suggestion was accepted in 90.3% of prescription in our study. Study conducted by Kuo et al also revealed 89% of the recommendations by clinical pharmacist were accepted by the prescribers.¹⁸ Our study demonstrated a significant association between prescription errors and pharmacist intervention ($p=0.019$). This indicates that outpatient pharmacist play a crucial role in reducing prescribing error. The pharmacists were able to make an intervention on almost all the cases of duplication and inappropriate drug. Study done by Meredith et al also suggests improvement in eliminating therapeutic duplication after pharmacist intervention.²⁰ However, pharmacist failed to intervene some dose and frequency error and dosage form related error in this study due reluctance of prescriber to accept their error and make correction.

A study suggests that stressful conditions, heavy workload, difficult working environment, insufficient communication within the team, and not being in good physical and mental condition of clinicians along with lack of skills and knowledge of relevant rules, tasks outside the routine, or taking care of another clinician's patient have also been associated with prescribing error.²¹ However, our study did not evaluate the factors associated with prescription errors.

CONCLUSION

Prescription error commonly occurs in clinical setting and pharmacists can play vital role in reducing such prescription errors. This study highlights the need of intervention to reduce prescription error. The inclusion of a hospital pharmacist, replacement of sloppy handwritten prescriptions by computerized physician order entry and the application of drug management policies are suggested to decrease drug related prescribing errors. Further, the monitoring committee may be constituted to review all prescriptions for appropriateness, adequacy and dosage accuracy before dispensing and/or refill for patients.

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REFERENCES

1. Aronson JK. Medication errors: definitions and classification. *Br J Clin Pharmacol* 2009; 67(6): 599-604.
2. Ni KM, Siang CS, Ramli MNB. Noncompliance with prescription writing requirements and prescribing errors in an outpatient department. *Malaysian Journal of Pharmacy* 2002; 1(2): 45-50.
3. Folli HL, Poole RL, Benitz WE, Russo JC. Medication error prevention by clinical pharmacists in two children's hospitals. *Pediatrics* 1987; 79(5):718-22.
4. Lesar TS, Lomaestro BM, Pohl H. Medication-prescribing errors in a teaching hospital: A 9-year experience. *Arch Intern Med* 1997; 157(14): 1569-76.
5. Díaz GE, Lázaro LA, Horta HA. Analysis of pharmaceutical intervention in outpatients pharmacy department. *Farm Hosp* 2013; 37(4):295-99.
6. Bates DW, Spell N, Cullen DJ, Burdick E, Laird N, Petersen LA, Small SD, Sweitzer BJ, Leape LL. The costs of adverse drug events in hospitalized patients. Adverse Drug Events Prevention Study Group. *JAMA* 1997;277(4):307-11
7. Lesar TS, Briceland LL, Delcoure K, Parmalee JC, Masta-Gornic V, Pohl H. Medication prescribing errors in a teaching hospital. *JAMA* 1990; 263(17):2329-34.
8. Lada P, Delgado G. Documentation of pharmacists' interventions in an emergency department and associated cost avoidance. *Am J Health Syst Pharm* 2007; 64(1):63-8.
9. Chisholm-Burns MA, Kim Lee J, Spivey CA, Slack M, Herrier RN, Hall-Lipsy E, Graff Zivin J, Abraham I, Palmer J, Martin JR, Kramer SS, Wunz T. US pharmacists' effect as team members on patient care: systematic review and meta-analyses. *Med Care* 2010; 48(10): 923-33.
10. Nkansah N, Mostovetsky O, Yu C, Chheng T, Beney J, Bond CM, Bero L. Effect of outpatient pharmacists' non-dispensing roles on patient outcomes and prescribing patterns. *Cochrane Database of Syst Rev* 2010;7:1-89.
11. Pande S, Hiller JE, Nkansah N, Bero L. The effect of pharmacist-provided non-dispensing services on patient outcomes, health service utilisation and costs in low- and middle-income countries. *Cochrane Database of Syst Rev* 2013; 2:1-71.
12. Dean B, Schachter M, Vincent C, Barber N. Prescribing errors in hospital inpatients: their incidence and clinical significance. *Qual Saf Health Care* 2002; 11(4): 340-344.
13. Poudel RS, Shrestha S, Khatiwada D, Thapa S, Prajapati A, Thapa L, Baral R. Prescription Errors and Pharmacist's Intervention at Outpatient Pharmacies of two Teaching Hospitals of Central Nepal. *World J Pharm Sci* 2015;3(3): 448-452.
14. Al-Dhawailie AA. Inpatient prescribing errors and pharmacist intervention at a teaching hospital in Saudi Arabia. *Saudi Pharm J* 2011; 19(3):193-196.
15. Pote S, Tiwari P, D'Cruz S. Medication prescribing errors in a public teaching hospital in India: A prospective study. *Pharm Pract(Granada)* 2007;5(1): 17-20.
16. Lesar TS. Prescribing errors involving medication dosage forms. *J Gen Intern Med* 2002; 17(8): 579-87.
17. Karthikeyan M, Lalitha D. A prospective observational study of medication errors in general medicine department in a tertiary care hospital. *Drug Metabol Drug Interact* 2013; 28(1): 13-21.
18. Kuo GM, Touchette DR, Marinac JS. Drug Errors and Related Interventions Reported by United States Clinical Pharmacists: The

- American College of Clinical Pharmacy Practice Based Research Network Medication Error Detection, Amelioration and Prevention Study. *Pharmacotherapy* 2013; 33(3): 253-265.
19. Al-Hajje A, Awada S, Rachidi S, Chahine NB, Azar R, Zein S, Hneine AM, Dalloul N, Sili G, Salameh P. Medication prescribing errors: data from seven Lebanese hospitals. *J Med Liban* 2011; 60(1): 37-44.
 20. Meredith S, Feldman P, Frey D, Giammarco L, Hall K, Arnold K, Brown NJ, Ray WA. Improving medication use in newly admitted home healthcare patients: A randomized controlled trial. *J Am Geriatr Soc* 2002; 50(9):1484–91.
 21. Lesar TS, Briceland L, Stein DS. Factors related to errors in medication prescribing. *JAMA* 1997;277(4):312–7.