



## **Prescription errors and pharmacist's intervention at outpatient pharmacies of two teaching hospitals of central Nepal**

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### **ABSTRACT**

Pharmacist's intervention on serious prescription errors has promoted treatment effectiveness, decreased treatment cost and reduced potential harm. We aim to evaluate the prescription errors and pharmacist's intervention at the outpatient pharmacies of two private tertiary care teaching hospitals of Central Nepal. A cross-sectional study was conducted for six working days in August 2014. Medication-prescribing errors were recorded by pharmacists using a checklist and discussed with the prescribers. The prescriptions that were corrected, changed or discontinued by the prescriber were considered as pharmacist intervened prescription. Frequency distribution and  $\chi^2$ -test were performed. The daily rate of prescription error was 4.25% (N=106). The commonest type of errors were dose and dosing frequency error (43, 40.6%), and therapy error (36, 34.0%) with the highest prevalence of errors in general medicine (27, 25.5%) and more errors by the prescribers who were residents.  $\chi^2$ -test showed a significant association of prescription errors with the prescriber (P=0.005) and pharmacist intervention (P=0.013). Prescription errors routinely occur in the outpatient settings showing the need for competent pharmacists. Both the prescriber and pharmacist need to work collectively in reducing prescribing errors, error related health hazards and economic burden to patients.

**Key words:** hospital, intervention, Nepal, pharmacist, pharmacy, prescription.



### **INTRODUCTION**

Medication error is a common cause of morbidity and mortality in a variety of health care settings [1,2]. Advance age, complex and/or urgent care, and extended hospital stay are associated with more errors, but significant errors may also occur in the outpatient settings and for patients of all ages [3]. Most mistakes have been made because of lack of attention, or because prescribers did not apply relevant rules. Working environment, workload of prescriber, whether or not they were prescribing for their own patient, communication within their team, physical and mental well-being, lack of knowledge, inadequate training, low perceived importance of prescribing, a hierarchical medical team, and an absence of self awareness of errors are

common risk factors for prescribing error [4]. Every day a high missing legal or procedural requirements has been observed in teaching hospitals with prescription errors such as duplication, wrong strength, wrong dosage form, wrong route, and drug-drug interactions [5-7] which end up with several drug related problems such as over-dosage, under-dosage, drug interactions, drug allergy, and non-compliance [6-8]. Pharmacist interventional studies have not only promoted treatment effectiveness and increased adherence [8] but also have markedly reduced the cost of treatment [9] and more importantly reduced the potential harm from serious prescription errors [6]. In addition to that involvement of pharmacist in direct patient care has shown encouraging results in patient outcomes, health care settings, and

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disease states [10]. Hence, besides the traditional concept of dispensing and counseling, the scope of non-dispensing roles of the pharmacist on patient outcomes and prescribing patterns seem to increase day-by-day [11,12]. In the context of Nepal, the presence of the pharmacists in a clinical setting is limited. Difficulty in policy implementation and lack of opportunity as well as competency to show their contribution in clinical settings could be the common reasons for limiting their presence. There was no study on the types of prescribing errors and usefulness of pharmacist's intervention from Nepal. Therefore, the present prospective cross-sectional study was conducted to evaluate the prescription errors and pharmacist's intervention at the outpatient pharmacies of two tertiary care teaching hospitals of Chitwan district of central Nepal.

## METHODS

This study was conducted in two private tertiary care teaching hospitals of Chitwan district of central Nepal: Chitwan Medical College Teaching Hospital (CMCTH) and College of Medical Sciences-Teaching Hospital (CMS-TH). Study data were randomly collected for a period of one week (six working days) from each teaching hospital in August 2014. On average the outpatient pharmacy of CMS-TH dispenses medication for about 150 patients and CMCTH dispenses for about 250 patients per day which may vary monthly. All medication orders either prescribed by practitioners, super-specializing students (DM/Mch) and post-graduates (MD/MS) during the study period were included in the study. All medication orders received in the outpatient pharmacy at both institutions were routinely reviewed by pharmacists using a prescription error checklist prior to dispensing drugs. Confirmed medication-prescribing errors detected by pharmacists were obtained, evaluated, and copies of the original medication orders were maintained in the pharmacy. The medication prescribing error was defined as medication orders that involved the therapy error (non-compliance with standard treatment guidelines; poly-pharmacy; inappropriate timing; drug interaction; inappropriate use of a specific dosage form, e.g. breaking of enteric coated, controlled release and sustained release formulation); dose and dosing frequency error; dosage form and administration error; and duplication. Following the identification of medication-prescribing errors, the pharmacist contacted the prescribers to obtain additional information and to discuss the prescription orders. The medication order(s) in question was confirmed as written, clarified, changed, or discontinued following the discussion between the pharmacist

and physicians. Corrected, changed or discontinued prescriptions were considered as pharmacist intervened prescription. For analysis, the prescribers were divided into two categories: Practitioners and Residents (super-specializing students and post-graduates). Various measures were entered in IBM-SPSS version 20 and the statistical analysis were completed using Chi-square.

## RESULTS

A total of 106 error prescriptions were collected during the study period with daily error rate of 4.25%. The commonest errors were dose and dosing frequency error (43, 40.6%) and therapy error (36, 34.0%). Our results showed that prevalence of error prescription was higher in general medicine/internal medicine (27, 25.5%), orthopedic (21, 19.8%) and surgery (14, 13.2%). Residents (57, 53.8%) were found to make more prescription errors than practitioners (49, 46.2%). There were 83(78.3%) pharmacist intervened prescriptions (Table 1). There was a significant association between prescription errors and prescriber ( $p=0.005$ ) as well as pharmacist intervened prescription ( $p=0.013$ ). However, there is no association of prescription errors with departments ( $p=0.082$ ) (Table 2).

## DISCUSSION

Our study indicates that the daily rate of prescription error was 4.25% and pharmacists were able to detect such errors and thus, play a crucial role in correcting them. However, pharmacists were not able to intervene in all the detected errors as few prescribers were reluctant to accept their error and make correction. Our result demonstrated that dose and dosing frequency error was most common, followed by therapy error, duplication and some degree of dosage form and administration errors. Dose and frequency error may cause inadequate or excess plasma concentration leading to inadequate therapeutic effect or toxicity. Studies also demonstrated incorrect dose as a most common type of prescribing error [6-7]. The therapy errors, duplication and dosage form and administration errors may result in poor outcomes, unwanted side effect and unnecessary economic burden to patients. Study by Lesar reported patients are at risk for adverse outcomes due to prescribing error related to inappropriate use of medication dosage forms [13].

Our data suggested that the prevalence of prescription error was higher in general medicine/internal medicine, orthopedic and surgery than other departments. The highest prevalence of

prescribing errors in these departments may be due to the high flow of patients and limited number of human resources. Further in these departments varied categories of drugs are used, which may lead to confusion among prescribers and subsequently prescribing errors. Inadequate drug therapy knowledge, inadequate consideration of patient characteristics, dose calculations, and nomenclature, and dosage formulation are contributed to prescribing errors [14]. In addition, increased workload, working environment, level of awareness of patients, poor physician-patient counseling, lack of involvement of pharmacist in treatment plan, and inadequate supervision and monitoring may account for these errors in our context.

Our results showed that practitioners were least likely to make prescription errors. The possible reason might be that the practitioners write medication order/ prescription relating primarily to their specialty, but post-graduate /residents are responsible for writing orders relating to numerous specialties except super-specializing students. A study done by Folli *et al* in two children's hospitals showed that most errors were seen in prescribers with the least training, though none of the physician groups in their study were error free [6]. In this study, there was significant association between types of prescription error and prescribers indicating that residents are more vulnerable to cause dose and frequency error, therapy error, and dosage form and administration error in comparison to practitioners. However, duplication was more prevalent amongst practitioners. Similarly, the significant association between types of prescription error and pharmacist intervened prescriptions demonstrate that the outpatient

pharmacists play a central role in correcting prescribing error because 83 (73.8%) error prescriptions were intervened on the basis of agreement between prescriber and outpatient pharmacist. The pharmacists were able to make an intervention in almost all the cases of duplication. Study done by Meredith *et al* suggests improvement in eliminating therapeutic duplication after pharmacist intervention [15].

There were few numbers of therapy errors such as inappropriate timing of medication, poly-pharmacy and inappropriate use of specific dosage forms (breaking of enteric coated, controlled release and sustained release formulation) that pharmacist could not intervene due to disagreement with the prescribers. However, studies from developed countries showed a decrease in the total number of medications prescribed after pharmacist intervention [16,17]. The situation of Nepal is different from developed countries where a pharmacist is a well-recognized and valued profession.

**CONCLUSION**

Prescription error was common in outpatient settings. Our study highlights that prescribers and pharmacists in Nepal need to work collectively in minimizing errors and subsequently improving patient care. However, there is a need of national level study to identify the prevalence of prescribing errors, their types and degree of health hazards to patients together with exploration of other ways to reduce the prescribing errors. This study also suggests the need of classifying the classes of drugs in which most errors occurred.

**PRESCRIPTION ERRORS CHECKLIST**

Department	Prescriber	Types of prescription error	Prescriber contacted	Pharmacist intervention
<input type="checkbox"/> General Medicine	<input type="checkbox"/> Post-graduate (MD/MS)	<input type="checkbox"/> Therapy error	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
<input type="checkbox"/> Neuro Medicine	<input type="checkbox"/> Super-specialising students (DM/Mch)	<input type="checkbox"/> Dose and dosing frequency error	<input type="checkbox"/> No	<input type="checkbox"/> No
<input type="checkbox"/> Paediatric	<input type="checkbox"/> Practitioners	<input type="checkbox"/> Dosage form & administration error	If No, why?	If No, why?
<input type="checkbox"/> Cardiology		<input type="checkbox"/> Duplication		
<input type="checkbox"/> Surgery				
<input type="checkbox"/> Orthopaedic				
<input type="checkbox"/> Nephrology/Urology				
<input type="checkbox"/> Dermatology				
<input type="checkbox"/> Gynaecology				
<input type="checkbox"/> ENT				
<input type="checkbox"/> Neurosurgery				
<input type="checkbox"/> Psychiatric				

**Table 1: BASELINE CHARACTERISTICS (N=106).**

Category		n (%)
<b>Errors</b>	Therapy error	36(34.0)
	Dose & dosing frequency error	43(40.6)
	Dosage form and administration error	8(7.5)
	Duplication	19(17.9)
<b>Departments</b>	General Medicine	27(25.5)
	Neuro Medicine	10(9.4)
	Paediatric	5(4.7)
	Cardiology	4(3.8)
	Surgery	14(13.2)
	Orthopaedic	21(19.8)
	Nephrology/Urology	4(3.8)
	Dermatology	3(2.8)
	Gyanecology	4(3.8)
	ENT	7(6.6)
	Neurosurgery	3(2.8)
	Psychiatric	4(3.8)
<b>Prescribers</b>	Residents	57(53.8)
	Practitioners	49(46.2)
<b>Pharmacist intervened</b>	Yes	83(78.3)
	No	23(21.7)

**Table 2: ASSOCIATION BETWEEN PRESCRIPTION ERRORS AND OTHER BASELINE CHARACTERISTICS.**

Categories		Prescription errors				P-value
		TE n(%)	DDFE n(%)	DFAE n(%)	D n(%)	
<b>Departments</b>	General Medicine	7(19.4)	11(25.6)	1(12.5)	8(42.1)	0.082
	Neuro Medicine	6(16.7)	4(9.3)	-	-	
	Paediatric	2(5.6)	3(7.0)	-	-	
	Cardiology	-	1(2.3)	2(25.0)	1(5.3)	
	Surgery	7(19.4)	4(9.3)	2(25.0)	1(5.3)	
	Orthopaedic	4(11.1)	10(23.9)	2(25.0)	4(26.3)	
	Nephrology/Urology	1(2.8)	1(2.3)	1(12.5)	1(5.3)	
	Dermatology	2(5.6)	1(2.3)	-	-	
	Gyanecology	2(5.6)	2(4.7)	-	-	
	ENT	-	5(11.6)	-	2(10.5)	
	Neurosurgery	1(2.8)	1(2.3)	-	1(5.3)	
	Psychiatric	4(11.1)	-	-	-	
<b>Prescribers</b>	Residents	20(55.6)	26(60.5)	7(87.5)	4(21.1)	0.005*
	Practitioners	16(44.4)	17(39.5)	1(12.5)	15(78.9)	
<b>Pharmacist intervened</b>	Yes	22(61.1)	37(86.0)	6(75.0)	18(94.7)	0.013*
	No	14(38.9)	6(14.0)	2(25.0)	1(5.3)	

TE=Therapy error, DDFE=Dose and dosing frequency error, DFAE=Dosage form and administration error, D=Duplication

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