

Research Article

Awareness and Perceptions of State Hospital Pharmacists on Dispensing Errors – Evidence from Three Hospitals in Sri Lanka

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ABSTRACT

Background: Errors may happen during the dispensing process and result in patient harm. Dispensing errors are preventable by error-proofing the system together with vigilance by pharmacists. **Objectives:** To assess awareness and perceptions on the prevalence, nature and possible causes of dispensing errors among pharmacists in selected hospitals in Sri Lanka.

Methodology: The study was a descriptive, cross sectional and multi-center study where all pharmacists in three hospitals (one tertiary care and two secondary care) in three different districts were interviewed (N=48). A pretested and validated (content and face) interviewer administered questionnaire was used to collect data and data were analyzed using IBM SPSS (version 25.0). The questionnaire assessed perceptions of pharmacists on the prevalence, types, and possible causes of dispensing errors. **Results:** Most pharmacists were within the age 20-40 years (67%) and 54% were women. Most pharmacists agreed that dispensing errors could happen (90%) in Sri Lanka while the rest had 'no idea' about dispensing errors. The majority (62%) agreed that they are prone to commit a dispensing error in the current hospital setup. Over 90% of pharmacists correctly identified the different types of dispensing errors. However, missing or wrong medicine information on dispensing labels, and dispensing the wrong quantity of medicine units were not considered as dispensing errors by a few. Among many reasons, pharmacists perceived, illegible handwriting on prescriptions (92%), similar or confusing medicine names (85%), dispensing of incomplete prescriptions (83%), and over worked pharmacists (81%) as main causes for dispensing errors in Sri Lanka. **Conclusions:** Most pharmacists in Sri Lanka were aware of the nature and prevalence of dispensing errors and highlighted numerous system issues that may cause them. These concerns must be urgently addressed by medical administrators to ensure medication safety of patients.

Key words: Pharmacists; Dispensing errors; Causes; Perceptions; Sri Lanka



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INTRODUCTION

Dispensing is a complex process (1) which requires, receiving the prescription, analyzing, reviewing, calculating doses, assembling of medications, labeling, checking and handing over of medications with required instructions and counseling. This process could be automated, semi-automated or manual depending on the circumstances and available resources. Either way, there is possibility of errors occurring of which the impact could be numerous, worst being death of a patient.(2)

“Dispensing error” has been defined in different ways depending on objectives of studies (3) and James et al. (2009)(4) reported nineteen different published definitions for this term. Regardless, dispensing errors are considered a category of medication errors and has been observed in practice, more commonly in the hospital setting.(3,5,6,7) There is growing concern about the number of patients affected by medication errors, especially during prescribing (8,9,10,11) and medication administration (12,13,14,15) but only a few studies have been done on harm related to dispensing errors all over the world.(5,7)

The nature and prevalence of dispensing errors that happen in both manual and automated processes are known.(2, 4, 16, 17) If pharmacists are aware of these facts on dispensing errors, most could be prevented. Among the many studies that have been carried out to investigate causes of dispensing errors and factors that helped to prevent dispensing errors (2, 4, 6, 18, 19), only a few studies have assessed the pharmacists’ knowledge, perception and their willingness in preventing dispensing errors. (19,20,21)

Therefore, this study is directed towards bridging the aforesaid gap and to acquire much needed information on knowledge, awareness and perceptions on possible causes of dispensing errors among hospital pharmacists with a goal of ensuring patient safety in the dispensing process.

METHODOLOGY

The study was a descriptive, cross sectional and multi-center study (part of a study that assessed the prevalence and types of dispensing errors). Pharmacists in three selected State sector hospitals representing three different Provinces in Sri Lanka were included. Study hospital 1 (SH1) is a tertiary care hospital situated in the Uva Province with 1493 beds, 295 daily admissions, 810 daily out patients and 424,024 annual clinic visits. Study hospital 2 (SH2) is a Type B Base Hospital in the Sabaragamuwa Province with 325 beds, 120 daily admission, 700 daily out patients and 126,272 annual clinic visits. Study hospital 3 (SH3) is a Type A Base Hospital situated in the North Western Province with 374 beds, 175 daily admissions, 740 daily out patients and 132,000 annual clinic visits. There were 32, 5, and 11 pharmacists employed in SH1, SH2, and SH3 respectively, and all (N=48) were included in the study. These pharmacists were involved mainly in the dispensing of medications for in-patients and out-patients of all specialty clinics such as, medical, diabetic, psychiatric and pediatric of study hospitals.

In-house definitions for dispensing errors were developed according to published literature (18, 22, 23, 24, 25, 26) and to suite the study setting. Pharmacists’ knowledge and awareness on different types of dispensing errors were assessed based on these definitions. An in-house interview

administered questionnaire was developed and was used to collect data. The questionnaire was content validated by an expert group (three Senior Lecturers in Pharmacy and three practicing Chief/ Senior pharmacists outside the research setting). A pilot study among pharmacists (N=10) working in a different hospital was used for face validation. The questionnaire mainly assessed four areas; demographic information of pharmacists, their perception on the prevalence of dispensing errors, types of dispensing errors, and possible causes of dispensing errors. Data were analyzed using the statistical data analysis package, IBM SPSS Statistics for Windows, version 25 (IBM Corp., Armonk, N.Y., USA). Results were interpreted as frequencies and percentages using descriptive statistics and relationships were detected using the Chi-square test. Ethics approval for this study was obtained from the Ethics Review Committee of the Faculty of Medical Sciences, University of Sri Jayewardenepura (Ref:85/17). Permission was obtained formally from all study hospitals. Written informed consent was obtained from all study participants. Contact details and telephone numbers of all the investigators were provided to the participants in a printed document. Questionnaire, information sheet and consent forms were translated to Sinhala and Tamil languages by professional translators. Confidentiality of the data and the privacy of participants were maintained through anonymity.

RESULTS

Demographic data of pharmacists are summarized in Table 1. Most pharmacists were in 31-40 years (38%) and 20 – 30 years (29%) age categories. Gender was equally distributed.

Table 1: Demographics of pharmacists

Age groups, (N, %)	
20-30 years	14 (29%)
31-40 years	18 (38%)
41-50 years	11 (23%)
51-60 years	05 (10%)
Gender, (N, %)	
Men	22 (46%)
Women	26 (54%)
Highest qualification achieved	
B.Pharm Degree	07 (15%)
Diploma in Pharmacy	41 (85%)
Average working experience of pharmacists (Years)	
Average experience (Men)	11.9± 2.2
Average experience (Women)	12.3±1.7
Average experience (Total)	12.1±2.0
Working hours per week (Self-reported)	
1-10 hours	10 (21%)
11-20 hours	03 (6%)
21-30 hours	04 (8%)
31-40 hours	31 (65%)
Continuous working hours (Self-reported)	
Less than 2 hours	07 (15%)
2 hours	01 (2%)
3 hours	04 (8%)
4 hours	11 (23%)
5 hours	08 (17%)
More than 5 hours	17 (35%)

Denominator to calculate percentages was the total number of participants (or total number of completed questionnaires); SD, Standard Deviation

The average experience working as pharmacist was 12 years. Most of the pharmacists (65%) worked 31-40 hours per week and 35% of pharmacists engaged in dispensing for more than 5 hours continuously per day (Table 1).

Ninety percent of pharmacists agreed that dispensing errors happen in Sri Lankan hospitals and 10% had no idea about the prevalence. However, most (67%) perceived the rate of dispensing errors to be less than 5% in Sri Lankan hospitals. Most (62%) pharmacists accepted the possibility of committing a dispensing error during work but 42% estimated the possibility of making a dispensing error to be below 1%. However, interestingly, 23% believed that they would never make a mistake (Table 2).

Awareness of pharmacists on different types of dispensing errors categorized as content errors, labeling errors, delivery/concomitant errors, and documentation errors was assessed (Table 3). Over 90% of pharmacists correctly agreed on the listed events as dispensing errors. Almost all pharmacists

correctly agreed with the listed subcategories of content errors as dispensing errors (90%-98%). However, 77% of them did not consider the absence of dosage form on the label, and 21% did not consider the absence of the medication quantity dispensed on the label as dispensing errors (Table 3). Some (14%) of the pharmacists did not identify the absence of prescribing information in a prescription as a concomitant dispensing error, while the majority (65%) failed to note that the absence of the pharmacist's identity as a dispensing error. It is also noteworthy that less than 10% of the pharmacists responded as either 'no idea' or 'not an error' under each dispensing error sub-category, implying high levels of awareness. Table 4 indicates the perceptions of pharmacists on possible causes of dispensing errors as was indicated on the questionnaire.

Table 2: Perception of pharmacists on prevalence of dispensing errors

Perception on prevalence of dispensing errors (N=48)	N (%)	
Perceptions on the presence of dispensing errors (N, %)	Yes	43 (90%)
	No	-
	No Idea	05 (10%)
Percentage of dispensing errors estimated (N, %)	Below 1%	13 (27%)
	2-5%	19 (40%)
	6-10%	05 (10%)
	11-25%	06 (13%)
	26-50%	03 (6%)
	51-100%	-
	No idea	02 (4%)
Possibility of you committing a dispensing error (N, %)	Yes	30 (62%)
	No	11 (23%)
	No idea	07 (15%)
Estimated percentage of your own dispensing errors (N, %)	Below 1%	20 (42%)
	1-5%	10 (21%)
	6-10%	02 (4%)
	11-25%	04 (8%)
	26-50%	-
	51-100%	-
	No idea	12 (25%)

Denominator to calculate percentages was the total number of participants from all three hospitals

Table 3: Awareness of pharmacists on types of dispensing errors

Types of dispensing errors	% of pharmacists (N=48)		
	Error	Not an error	No idea
Content errors (%)			
Dispensing a wrong medicine	97.9%	-	2.1%
Dispensing an unsuitable strength	93.8%	2.1%	4.2%
Dispensing a wrong dosage form	93.8%	-	6.3%
Dispensing the wrong quantity of medicines	95.8%	2.1%	2.1%
Dispensing deteriorated medicine	89.6%	6.3%	4.2%
Omitting dispensing a medicine	95.8%	2.1%	2.1%
Labeling errors (%)			
No label on a dispensed medicine	95.8%	2.1%	2.1%
Wrong medicine name on the label	97.9%	-	2.1%
No medicine name on the label	87.5%	2.1%	10.5%
Wrong medicine strength on the label	95.8%	2.1%	2.1%
No medicine strength on the label	89.6%	2.1%	8.4%
Wrong frequency on the label	95.8%	2.1%	2.1%
No frequency on the label	93.8%	4.2%	2.1%
Wrong dosage form on the label	95.8%	2.1%	2.1%
No dosage form on the label	77.1%	18.8%	4.2%
Wrong directions on the label	95.8%	-	4.2%
No directions on the label	95.7%	2.1%	2.1%
Wrong quantity on label	81.3%	12.5%	6.3%
No quantity on label	64.6%	20.8%	14.6%
Wrong duration on the label	85.4%	10.4%	4.2%
No duration on the label	79.2%	14.6%	6.3%
Unapproved drug abbreviation on the label	83.3%	4.2%	12.5%
Concomitant errors (%)			
Drug issued to wrong patient	91.7%	6.3%	2.1%
Dispensing incorrectly packed medicines	95.8%	2.1%	2.1%
Dispensing with incorrect or inadequate information	89.6%	2.1%	8.3%
Dispensing medicines with interactions	85.4%	8.3%	6.3%
Dispensing medicines to prescription without patient information	91.7%	6.3%	2.1%
Dispensing medicines to prescription without complete drug information	95.8%	2.1%	2.1%
Dispensing medicines to prescriptions without prescriber information	78.4%	13.5%	8.1%
Documentation errors (%)			
Pharmacists who dispensed the medicines cannot be identified	64.9%	21.6%	13.5%

Denominator to calculate the percentage was the total number of participants from all three hospitals

Table 4: Perception of pharmacists on possible causes of dispensing errors

Perception on causes of dispensing errors	% of pharmacists (N=48)		
	No	Yes	No idea
Prescription factors (%)			
Poor handwriting by doctors	6.3%	91.7%	2.0%
Similar or confusing medicine names (E.g.: Look alike medicines on a prescription)	6.3%	85.4%	8.3%
Use of brand names	14.6%	56.3%	29.2%
Absence of proper packaging and labeling system for prescribed medicines	14.6%	50%	35.4%
Complex prescriptions	16.6%	50%	33.3%
Dispensing incomplete prescriptions	8.3%	83.3%	8.3%
Personal factors (%)			
Over worked pharmacists	10.4%	81.3%	8.3%
Pharmacists' fatigue/ tiredness	8.3%	77.0%	14.6%
Job dissatisfaction of pharmacists	12.5%	52%	35.4%
Large number of prescriptions to be dispensed by a pharmacist	12.5%	72.9%	14.6%
Unfamiliar with tasks in the dispensing process Eg: Compounding, drug interaction checking	10.4%	54.2%	35.4%
Lack of pharmacological knowledge on medicines	6.25%	66.7%	27.1%
Pressure from Administrators (Personal)	12.5%	60.4%	27.1%
Negligence about patient safety as healthcare professionals	10.4%	56.3%	33.3%
Environmental factors (%)			
Interruption (Mobile call, other staff)	10.4%	79.2%	10.4%
Design of pharmacy and shelf layouts	12.5%	56.3%	31.3%
Lack of privacy for patient when dispensing	12.5%	58.3%	29.2%
Insufficient time to talk with the patient	10.4%	75%	14.6%
Inadequate staff	16.7%	68.8%	14.6%
Time of the day	16.7%	58.3%	25%
Inexperienced supporting staff	14.6%	68.7%	16.7%
Patient demands and aggressive patients	12.5%	64.6%	22.9%
Pressure from the administrators	14.6%	60.4%	25.0%

Denominator to calculate the raw percentage was the total number of participants from all three hospitals

Poor handwriting of prescribers (92%), similar or confusing drug names (85%) and dispensing incomplete prescriptions (83%) were selected as causes of dispensing errors by most pharmacists. Over worked pharmacists (81%), tiredness (77%) and having many prescriptions to dispense by a pharmacist (73%) were identified as personal factors leading to dispensing errors by many. Use of brand names (65%), issues related to packaging and labeling of medicines (54%), complex prescriptions (59%), job dissatisfaction of pharmacists (54%), having to perform unfamiliar tasks in the dispensing process (E.g.: Compounding) (58%), negligence by pharmacists leading to dispensing errors (58%) and issues related to design of the pharmacy (59%) were also accepted as possible causes of dispensing errors by one half of the pharmacists.

DISCUSSION

Ninety percent (90%) of pharmacists were aware that dispensing errors occur in Sri Lankan hospitals but underestimated the rate of occurrence. Many of them (67%) estimated dispensing errors to be less than 5% in Sri Lankan hospitals. While 62% of the pharmacists accepted the possibility of them committing dispensing errors, they rated this possibility to be lower than 1%. A considerable number (23%) perceived that they would never make errors. We assessed the actual rate of dispensing errors among the same three hospitals (of which this awareness study was a sub-study) and found 39 dispensing errors per prescription (27) which was far greater than was estimated by pharmacists. This trend of underestimating the prevalence of dispensing errors by pharmacists was also evident in other studies. In an Australian study, only 70.9% accepted the possibility of failing to detect dispensing errors in their practice.(19) In a study done in

Nigeria, 50% of the pharmacist estimated the frequency of occurrence of dispensing errors as 1 per 100 prescriptions (28) while pharmacists (53%) in another Nigerian study perceived that they would make 1-2 mistakes or errors a month.(29) However, in the latter study, it was observed that, pharmacists make more mistake that they perceived where 5% of the pharmacists made more than six mistakes/errors within a month in their actual practice.(29) This global trend of underestimating dispensing errors could partly be due to the oversight by pharmacists of system errors that lay dormant but could one day transform into an active failure.

Sri Lankan pharmacists were aware of different categories of dispensing errors, where more than 80% could correctly identify different types of content, labeling, and concomitant errors with their existing knowledge. Similar to this study, Facchinetti et al. (30) reported that pharmacists in a US hospital could detect 87.7% of the 812 mock dispensing errors given to them.

Comparatively lower levels of awareness were observed on identifying documentation errors and some labeling errors. This is possibly because, pharmacists pay less importance on measures like providing dispensing instructions in clear block capital letters or in printed form, devoid of abbreviations, and do not routinely clarify patient doubts and misinterpretations adequately during their day to day dispensing work in Sri Lanka.(31) Even though, most of the pharmacists were familiar with the different types of dispensing errors, there is a concern about some who responded as 'no idea' or failed to identify a dispensing error as this indicates a possible threat to dispensing safety.

Pharmacists perceived that poor handwriting of prescribers (92%), similar or confusing drug names (85%), and dispensing to incomplete prescriptions (83%) as prescription related factors that caused dispensing errors. This indicates that pharmacists are aware of universal causes of dispensing errors as identified by many published studies. Studies done in Britain, US, France and Nigeria reported that look-alike/sound-alike medications or similarities in medicines names as perceived causes of dispensing errors (7,29,32,33). Further, Anto et al, 2010 (34) reported illegible handwriting in prescriptions (15%) as potential causes of dispensing errors associated with labeling errors. The study by James et al., (1) is evidence that look-alike/sound-alike medications caused dispensing errors as found through a retrospective study using dispensing error detection software reports.

According to our findings, 34% of pharmacists claimed to dispense for more than five hours continuously per day (Table 1) and generally, Sri Lankan pharmacists contribute for 6-7 hours of dispensing daily. According to a document issued by the Ministry of Health, Sri Lanka, a pharmacist is expected to dispense medicines to at least 78 patients per working day (35), but it was evident during the study that they dispensed medicines to a few folds more patients than expected due to the limited number of pharmacists in the hospital. Working in such an environment, pharmacists of these study settings knew that, over working (81%), fatigue/ tiredness (77%), and having to dispense many prescriptions (73%) could lead to dispensing errors. Published research worldwide too provides evidence that system issues like, high work load, understaffing, poor knowledge, lack of concentration, and

hurrying through tasks lead to dispensing errors.(2,4,18,19,28,29,32,33,36)

Interruptions (79%) and insufficient time to talk with the patient (75%) were selected by most pharmacists as possible causes of dispensing errors in relation to dispensing environment. Hettihewa et al., (37) too reported that short dispensing time could lead to dispensing errors in Sri Lanka. Similarly, pharmacists in UK, France, Australia and Nigeria also perceived communication failures, the physical structure of the working environment (E.g.: Crowded and confusing medication storage), poor infrastructure (E.g.: Inadequate lightening, uncomfortable temperature in dispensing area), inadequate staff, distraction (E.g.: Noise) and interruptions (E.g.: Phone calls) as possible causes of dispensing errors.(1,4,6,18,19,28, 32,33,34,38) A study by Flynn et al., (39) found a significant association between interruptions/ distractions per half hour and labeling errors ($r= 0.0948$, $p<0.05$) which is evidence for some of these perceptions.

This study was a multi-center study but the three hospitals were selected through convenience sampling, thus limiting the generalizability of results. Outcomes of the study solely depended on the pharmacists' responses and their perceptions. It would be better if actual practices and causes of dispensing errors could be audited and compared with self-reported practices to recognize if gaps which could be corrected exist.

CONCLUSIONS

Most pharmacists were aware that dispensing errors could happen in Sri Lankan hospitals but the majority underestimated the actual prevalence. While many accepted the

possibility of committing dispensing errors within the current system, some were overconfident of not making any dispensing errors at all. Pharmacists had a satisfactory level of theoretical knowledge on different categories of dispensing errors but failed to identify some labelling and documentation failures as errors. From other research in Sri Lanka, it is evident that pharmacists neglect some safety practices (31) which according to this study happen to be aspects they didn't regard as dispensing errors. As it is evident that pharmacists are motivated to practice what they believe, it would be wise to make pharmacists aware of the prevalence of dispensing errors with adequate practical education on the different types, even the system failures that could transform into errors someday. Illegible handwriting, similar drug names, high prescription volume, overworking, and tiredness of pharmacists, distractions and insufficient

time for counselling are the main possible causes of dispensing errors in Sri Lankan hospitals as perceived by pharmacists which were very consistent with perceptions reported in other countries. We recommend to strengthen the error reporting systems for reporting of dispensing errors, and to encourage root cause analysis to find actual causes of dispensing errors so that pharmacists may learn and improve the dispensing process for the sake of patient safety.

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