Original Research Article

Prescription Audit and Dispensing errors in the Outpatient Pharmacy of Tertiary Care Multispecialty Teaching Hospital

ABSTRACT:

Although errors occurring during the process of dispensing may affect the goal of the treatment, they also can be the significant cause of morbidity and mortality. There are only few published evidences which focuses on the errors of dispensing that occurs in the pharmacy. This study focuses on identifying the dispensing errors, impact of brand substitution on cost and drug-drug interactions.

Methodology: Prospective observational study conducted over a period of eight weeks in outpatient hospital pharmacy of tertiary care multi-speciality teaching hospital, Tamil Nadu. Prescriptions and medication bills and dispensed medicines are collected from the hospital pharmacy to obtain data required for the study. Prescription containing only medical devices were excluded from the study.

Results: Out of 1010 prescriptions, dispensing errors were present in 419 (41.48%) prescriptions whichconsist of 557 errors. The errors include dispensing multi-pills to make the required dose is 3.77%,tablet splitting is 0.8%, incorrect strength is 1.07%, omission error due to unavailability is 31.4%,dispensing drugs with brands other than prescribed brands is 63.7%. Prescriptions which had morethan three drugs were analysed for drug-drug interactions (n=389). DDIs were present in 156(40.1%) prescriptions which had a total of 281 interactions.

Conclusion: The brand substitution and omission errors are the major causes of dispensing errors. Brandsubstitution is not always recommended as it may have some adverse effects because of salt andexcipients variation. Pharmacists are in the position to identify and reduce the drug-druginteractions by discussing with the physicians.

Keywords: Dispensing Errors, Omission error, Drug-drug Interactions, Cost effectiveness, Brand substitution.

1.INTRODUCTION:

Medication errors are common, preventable errors but they are the important source of errors that may lead to morbidity and mortality in the health care settings [1,2]. They can occur at any time during drug therapy such as prescribing, dispensing, administering, or monitoring [3]. Dispensing errors may occur during dispensing drugs by pharmacists, which may affect the goal of the therapy and may increase the chance of morbidity and mortality [4,5]. The pharmacy staffs are primarily responsible for this error and they can occur at any stage during the process of medication dispensing. A dispensing error is defined as the discrepancy between the written order in a prescription and the medications delivered to the patients by the pharmacists [5-10].

The different types of dispensing errors reported worldwide which include dispensing of wrong drugs, dosage, formulation, quantity, failure to supply the drug, labeling error (includes an error in the drug name, strength, directions and warnings, quantity, patient name, and completely wrong label) [10,12-22]. The hospital pharmacy is the place of origin of medication errors and potential adverse drug reactions [2,11].

Drug-Drug Interactions (DDIs) are defined as the influence of the drug on one another in pharmacokinetics or pharmacodynamics, which may result in unwanted effects, decreased efficacy and/or increased toxicity [23]. They are the significant cause of preventable adverse clinical outcomes [24]. Drug-drug interactions are one of the easily preventable errors among medication errors. Usually, more than one drug is used for treating a disease that carries an increased risk of DDIs with serious health consequences. There are some factors that could raise the potential negative effect of drug interactions. They are patient's age, number of underlying disease conditions, or drug administration with a low therapeutic index [25]. As many of the physicians may not aware of potential interactions of drugs, it is the responsibility of the pharmacist to avoid dispensing of drugs together that may cause serious drug-drug interactions [26].
There are several patients harmed by medication errors and the studies are mainly concentrating on administration and prescribing errors while dispensing errors are also an important cause of producing harmful effects [27]. As there is only a limited number of studies that focus on the dispensing errors occurs in pharmacy, this study focuses on identifying the rate of dispensing errors, impact of brand substitution on cost, and drug-drug interactions.

2. METHODOLOGY:

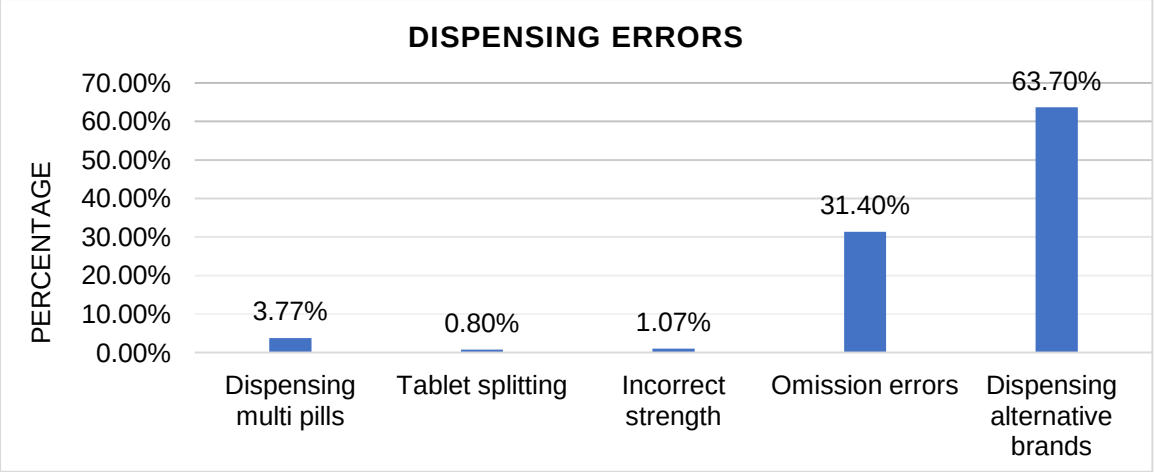
A Prospective observational study was conducted for the period of eight weeks at the hospital pharmacy department of tertiary care multi-specialty teaching hospital, Tamil Nadu. The patient's prescriptions, dispensed medications and medication bills are collected for auditing. Institutional ethical committee [IEC] approval was obtained for the study. Inclusion of all the prescriptions irrespective of the department received in the hospital pharmacy and prescriptions that had only medical devices were excluded from the study.

2.1 Statistical Analysis:

The data obtained were analyzed using Microsoft Excel® 2016 software and the results have been expressed in percentages and shown in tables and charts.

3. RESULT AND DISCUSSION:

Of the total 1060 prescriptions collected, 50 were excluded as it had only medical devices. Finally, 1010 prescriptions were included, in which 41.4% of prescriptions had dispensing errors which consists of about 557 errors. The dispensing errors were identified and classified as in Figure 01. The total dispensing error rate was 16.45 % which was low when compared to the Amador A. BonifacioNeto et al study [28]. However, most of these errors are due to brand substitution which may cause adverse effects because of the varying salt forms and it may also cause cost variation [29,30]. In content errors, omission errors were high (31.40%) which was associated with the unavailability of drugs at the time of dispensing. This result is similar to the study of Tania AzevedoAnacleto et al study which was done in Brazil. [31] Figure 01.
Fig. 1. ***Dispensing errors identified and classified.***



The total number of drugs prescribed in 1010 prescriptions was 3384. Out of which, only 25% of drugs were prescribed in generic name whereas the remaining were prescribed in the brand name. Due to the unavailability of the prescribed brand, the pharmacist had to dispense the alternative brand available in the pharmacy. Though the active ingredient did not vary, this alteration may increase or reduce the total cost of medications [29]. Hence, we have analysed the cost variation of prescribed brands and dispensed brands. The difference in cost and the percentage cost variation was calculated using the formula,

Cost variation = Dispensed brand cost - Prescribed brand cost

Percentage of cost variation = (Cost variation / Prescribed cost) *100

It was found that 353 drugs dispensed in other brands, the cost difference of 23 (6%) drugs was found to be zero. The percentage cost variation of 137 (39%) drugs was 22.1% which indicates the dispensed brand cost is higher than the prescribed brand and the percentage cost variation of other 193 (55%) drugs was -21.6% (the negative sign indicates that the cost of dispensed brands is less than the prescribed brands) as given in table 01.

No. of Drugs n=353 (%)	Sum of all Dispensed Brand Medications Cost (INR)	Sum of all Prescribed Brand Medication Cost (INR)	Difference in cost (INR)	Percentage of cost variation
23 (6)	450.52	450.52	0	-
137(39)	3045.78	2494.53	551.25	22.1
193(55)	7119.98	9080.48	-1960.5	-21.6

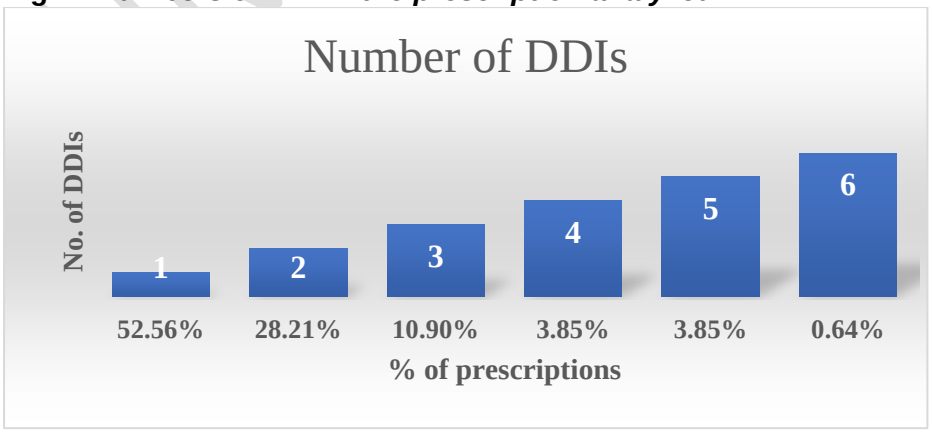
Table 1.*Cost variation analysis of prescribed and dispensed brands*

The prescriptions which contain more than three drugs were analyzed for drug-drug interactions (DDIs). Medscape drug interaction checker (v1033.0), Stockley's drug interaction book(12th edition), Micromedex drug interaction software (v2130) were used to identify drug-drug interactions in the prescriptions. 389 prescriptions were examined for DDIs. A total number of 281 interactions were identified in 156 prescriptions (40.1 % from 389) as shown in (*Table 02 & Figure 02*), which was less compared to the study of Ajay Chandra et al. [32]. More number of drug interactions was found in Cardiology (72%) and Nephrology (66.6%), there were no drug interaction found in the prescriptions collected in the pediatrics department.

S.NO.	Department	Total No. of Prescriptions (n= 389)	Prescriptions with drug interactions (%)	Prescriptions without drug interactions (%)
1	General Medicine	113	53 (46.9)	60 (53.1)
2	Cardiology &Cardiothoracic	50	36 (72)	14 (28)
3	Dermatology	27	6 (22.23)	21 (77.78)
4	ENT	27	4 (14.81)	23 (85.19)
5	Septic Ward	5	1 (20)	4 (80)
6	Surgery & ICU	47	16 (34.04)	31 (65.96)
7	Nephrology	9	6 (66.67)	3 (33.33)
8	Neurology	17	5 (29.41)	12 (70.59)
9	Orthopedics & Rheumatology	43	16 (37.21)	27 (62.79)
10	Respiratory	9	2 (22.22)	7 (77.78)
11	OBG	9	2 (22.22)	7 (77.78)
12	Pediatrics	7	0(0)	7 (100)
13	Urology	14	4 (28.57)	10 (71.43)
14	Psychiatry	12	5 (41.67)	7 (58.33)

Table 2. ***Prescriptions containing Drug-drug interactions***

Fig. 2.*Numbers of DDI in the prescription analyzed*



The DDIs found were classified in to mild, moderate and severe and it was found that 55 interactions (19.57%) present were mild, 155 (55.16%) were moderate and 71(25.26%) were severe. The moderate drug interactions were found to be high in our study, which was similar to the Ajay Chandra et al study [32] where the rate of moderate DDI is 74.37%. (Table 2).

4.CONCLUSION:

In this study, the brand substitution and omission errors are the major causes of dispensing errors which was mainly due to the non- availability of prescribed medications. Brand substitution is not always recommended as it may have some adverse effects because of salt and excipients variation. Pharmacists should make sure that the drugs given in hospital formulary are available at all the time. Dispensing alternative brands are only recommended when the brand has similar active ingredient, same pharmaceutical form, cost effective, only after getting approval from the physician. Pharmacists are in the position to identify and reduce the drug-drug interactions by discussing with the physicians and providing counselling to the patients.

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