

Study of Medication Error in Hospitalised Patients in Tertiary Care Hospital

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ABSTRACT

AIM: The aim of the present investigation is to study the incidence medication error (ME) in hospitalized patients in a tertiary care hospital. Further, the study was aimed to categorize medication error in the hospitalized patients of surgery and general medicine wards of tertiary care hospital. **Method:** A prospective observational study of seven months was conducted in the department of surgery ward and general medicine ward at Jivraj Mehta Smarak and Health Foundation. Data were collected using structured data collection form. Major Findings are recorded for the demographic details, drug details and criteria for identifying errors and their categorization, details of drugs involved in errors and rationality of prescription. **Result:** The study was conducted in 427 patients, where 231 were males (54%) and 196 were females (46%). Out of 427 cases, MEs has detected in 196 cases (45.90%). Most of the medication errors were observed in the age group of 41-60 years (34.69%). Reported incidences of MEs, 99 (51%) and 97(49%) were observed in surgery and general medicine department, respectively. The most frequent error was prescription errors (138; 70.40%) followed by administration errors (58; 29.59%). A potential drug interactions were observed in 95 cases (48%) and serious drug interactions in 28 cases (14%). Majority prescriptions were semi-rational (178; 41.68%) followed by irrational (96; 22.48%) and rational (135; 31.61%). On the evaluation of severity, majority of MEs were category C (118; 60%) followed by category B (44; 22%) and category A (34; 17%). Majority of MEs were belonging to cardiovascular drugs (23; 23%) in medicine ward and gastrointestinal drugs (29; 29%) in surgery ward. **Conclusion:** The study helps to assess the incidence of medication error and to categorize medication error. In the general medicine department, the majority of patients were geriatrics who are more prone to errors, thus guidelines for safe use of medications in geriatrics should be strictly implemented to prevent medication errors. Antimicrobials are the major class of drugs involved in medication errors, thus this study recommends strict implementations of antibiotic policy in the hospital.

Key words: Drug -drug interactions, Medication Errors, Prescribing Error, Administration error.

INTRODUCTION

The National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP) has defined medication error as “Any avertable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient and consumer”.¹ American Society of hospital pharmacist’s guidelines for medication errors stated that the incidence of medication errors is not exactly known because of variations in different definitions of medication error or different methods.² An error is a disorder of intentional act, something incorrectly done through ignorance.

Error arises when an action is anticipated but not performed.³

Medication errors can take place at any step from prescribing to the administration of the drug. In India, 5.2 million injuries have been reported each year due to medication errors and adverse events while in US 7000 deaths have been reported in hospitals per year due to medication error. The medication error increases morbidity, mortality, cost burden, and decreases the patient’s confidence in the healthcare systems. The American Hospital Association lists some common types of medication problems

DOI: 10.5530/ijopp.11.1.6

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such as incomplete patient information, unavailable drug information, miscommunication of drug orders, which can involve poor handwriting, confusion between drugs with similar names, misuse of zeroes and decimal points, confusion of metric and other dosing units, inappropriate abbreviations, lack of appropriate labeling as a drug is prepared and repackaged into smaller units, environmental factors, such as lighting, heat, noise, and interruptions that can distract health professionals from their medical tasks.⁴ Medication errors may be committed by both inexperienced and experienced persons like doctors, pharmacists, dentists, patients, manufacturers and other healthcare providers.⁵

The present study has been undertaken with the aim of finding out the incidences of medication errors in indoor patients of a tertiary care center. The purpose of the present study was to evaluate demography about medication errors, drug-drug interactions and rationality of Prescription in general medicine ward and surgery ward at a tertiary care hospital.

METHOD AND MATERIAL

Place of study

The study was conducted in inpatients of a tertiary care hospital located in Ahmedabad in Gujarat. Before initiating the study, the study was approved by ethics committee of Jivraj Mehta Smarak and Health foundation, Ahmedabad.

Study design

A prospective observational study was carried out for a period of 8 months from 15th June 2016 to 15th February 2017 in hospitalized patients of Jivraj Mehta Smarak and Health foundation, Ahmedabad.

Study population

In patients in the general medicine department and surgical department, irrespective of the gender, age and diseases were included in the study. All outpatients, patients in the medical intensive care unit, inpatients without medication therapy, pregnant women and psychiatric patients were excluded from the study.

Study procedure

During the study, inpatients case records were reviewed, which includes patient's case history, diagnosis, physician medication order sheets, nurse medication administration records, progress chart, laboratory investigations. This information was documented in the patient profile form. The data was collected by chart review method at inpatient department for assessment of medication errors such as omission errors, wrong time errors, unau-

thorized drug error, improper dose error, wrong dosage form error, wrong drug preparation error, wrong administration technique, deteriorated drug error, monitoring error, compliance error and other error. Inpatient case records were reviewed and was followed from the date of admission till the date of discharge. Whenever, medication error was identified, data from patient profile form was transferred to medication error reporting form. All the observed errors were documented and analyzed for the following parameters such as age and gender, diagnosis of the patient, number of medication per prescription, length of hospital stay, type of medication errors, and level of severity of errors by using NCCMERP index, drug interactions by Medscape drug interaction checker. Correlation of age versus errors, number of medications versus errors, length of stay versus errors was also analysed. The rationality of prescription orders was assessed by using Phadke's criteria. Based on the Phadke's criteria, each prescription was allocated 30 points. Out of which, prescription scoring between 0-14 were categorized as irrational, 15-24 semi-rational while 25-30 were categorized as rational.

Statistical analysis

Descriptive statistics were applied for data variables. The p value less than 0.05 was considered as statistically significant. Data was analyzed using statistical analysis package for social sciences (SPSS) 16.0 for windows.

RESULTS

Demographic Status of the Patients

Mean age of the patients included in the study was 49.21 ± 18.13 years and 49.22 ± 18.18 years in medicine ward and surgery ward, respectively. Age group between 41-60 years, 68 (34.69%) had the higher number of medication errors. Majority of Medication error was observed with IV route (112; 57.14%) followed by oral route (55; 28.06%). Majority of medication errors was observed in male (109; 55.61%) followed by female (87; 44.38%). In addition, the majority of the medication errors were due to drugs of cardiovascular system (23; 23.71%) followed by antibiotic drugs (21; 21.64%) in medicine ward (Figure 1) and gastrointestinal drugs (29; 29.29%) were highest in the surgery department (Figure 2). During the study periods, total 99 cases were collected in the surgery department with medication errors. Out of them, 33 (16.83%) cases were found in gastrointestinal surgery, 32 (15.81%) orthopedic surgery, 12 (6.12%) CVS surgery, 12 (6.12%) renal surgery, 2 (1.02%) dermatology surgery and 8 (4.08%) respiratory surgery (Figure 3).

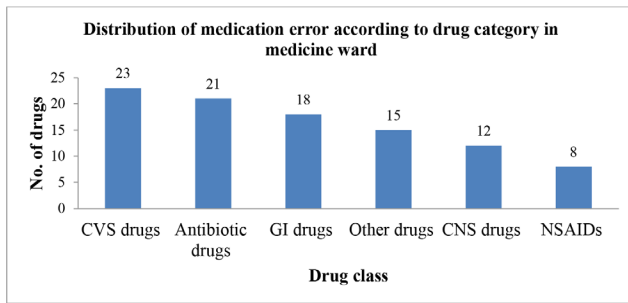


Figure 1: Distribution of medication error according to drug category in medicine ward

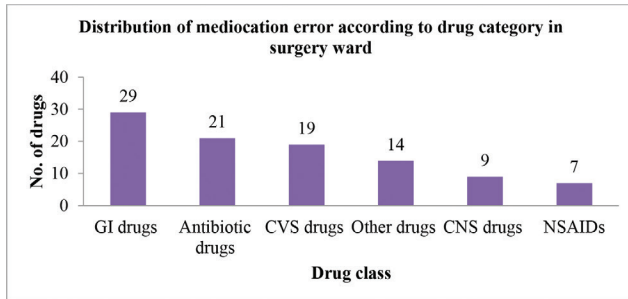


Figure 2: Distribution of medication error according to drug category in surgery ward

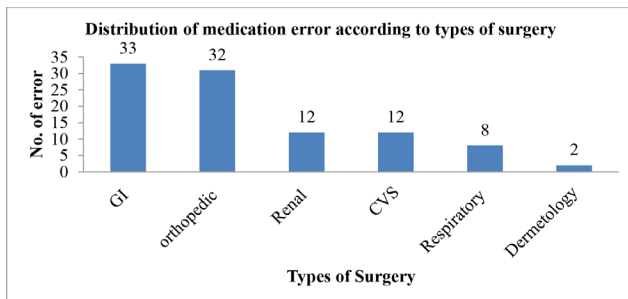


Figure 3: Distribution of medication error according to types of surgery

Medication Errors

The total number of errors found was 196, among which prescribing errors (138; 70.40 %) were the most frequently occurring type of error, which was followed by administration error (58; 29.59%) (Table 1). Among prescribing errors, omission of drug dose (104; 53.61%) is observed at larger extent (Table 2). Whereas among administration errors, omission of drug (55; 28.06%) and wrong time (3; 1.15%) were commonly observed (Table 3). Out of 196 observed medication errors, 95 (48%) had the DDIs. The majority of DDIs was minor 37 (18.87%) followed by a significant 30 (15.30%), while 28 (14.28%) DDIs were serious.

Types of errors	No. of errors (%)
Prescribing error	138 (70.40%)
Administration error	58 (29.59%)
Total	196 (100%)

Types of prescription error	Number of prescription error	Percentage of prescription error
Incorrect drug selection	3	1.53%
Writing error (dose not written)	104	53.06%
Drug frequency not prescribed	28	14.28%
Wrong brand name written	3	1.53%

Types	No. of errors (%)
Omission of drug	55 (28.06%)
Wrong time	3 (1.15%)
Total	58 (29%)

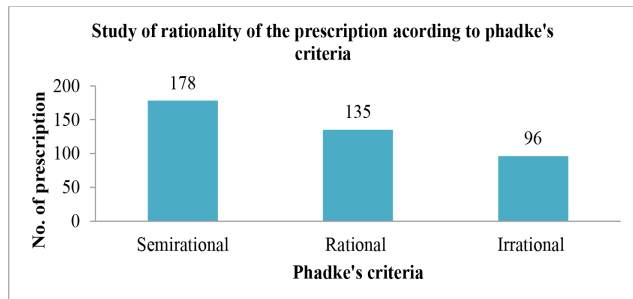


Figure 4: Rationality of prescription according to Phadke's criteria

The rationality of prescription was assessed using Phadke's criteria. Majority of prescriptions (178; 41.68%) scored between 15 to 24 points, and categorized as semirational while 135 (31.61%) prescriptions scored between 25 to 30 points, thus categorized as rational and 96 (22.48%) prescriptions scored between 0 to 14 points categorized as irrational (Figure 4). Medication error index of NCCMERP was used to assess the severity of medication error. It was found that the medication error belonged to the category Error, No harm which comes under the sub-category B 44 (22.44%) and sub- category C 118 (60.20%) followed by 34 (17.34%) in the category No Error which comes under the sub- category A. The

Table 4: Level of severity of reported medication error

Level of severity		Number of medication errors
No error	Category A	34(17.34%)
Error, No harm	Category B	44(22.44%)
	Category C	118(60.20%)
	Category D	0
Error harm	Category E	0
	Category F	0
	Category G	0
	Category H	0
Error, Death	Category I	0

other levels of severity such as Error harm, Error Death were not identified during the study period (Table 4).

DISCUSSION

Medication errors thought not always reported are the serious problem in health care setting. Medication error is a source of significant morbidity and mortality in the health care setting.¹ Medication errors occur at any stage of treatment, like prescribing, administration and Dispensing.² Clinical pharmacists play a major role in this situation for strong intervention by detecting and preventing medication errors to improve patient health. Medication errors are common in hospitalized patients. The overall percentage of medication errors observed in our study was 45.90% without causing any harm to the patients, whereas a study conducted in a multispecialty hospital detected 39% of medication error without any fatal outcome.⁶ The similar results were reported by Patel *et al.*² The present study showed that male patients were more affected from medication errors, which is similar to different studies performed in Karnataka, Iran and Saudi Arabia.^{7,8,9}

The present study demonstrated that 41-60 years age group was more affected in medication errors, whereas different studies performed at different hospitals reported the similar age group patients involved in medication error.^{1,6,10} On the contrary, Pote *et al.* Reported that more than 60 years was more affected by medication errors.¹¹ Our study demonstrated that the IV route of administration was involved in medication error which is supported by Ross *et al.* In Pediatric department and Patel *et al.* Tertiary care hospital.^{2,7} This finding suggests that medication errors are commonly associated with IV route.

During the study periods, 1320 drugs prescribed in the general medicine ward. Majority of the observed medication errors were found with drugs belonging to the class of cardiovascular (23 drugs) followed by antibiotics

(21 drugs). Our finding has been supported by a two study done in general medicine ward and general teaching hospital where medication errors with cardiovascular drugs is highest.^{2,10}

Total 1356 drugs were prescribed in the surgery ward. The majority of the observed medication errors were found with drugs belonging to the class of gastrointestinal drugs and antibiotics. During the study periods, surgery department observed 99 incidences of medication errors where nearby 33 cases (16.83%) were found in gastrointestinal surgery, 31 cases (15.81%) in orthopedic surgery, 12 cases (6.12%) in CVS surgery, 12 cases (6.12%) in renal surgery, 2 cases (1.02%) in dermatology surgeries and 8 cases (4.08%) in respiratory surgery.

The present study revealed that the risk of medication errors increases as the number of medications per prescription increases. It was observed that an increased number of medication errors when the patient had medication s more than 11 and experienced 20 errors. The similar results were reported by Shufiza N, *et al.*¹³ The present study also shown that length of hospital stay increases with the increase in number of medication errors.

In our study, Prescription errors (138; 70.40%) are the most common among the types of errors. Similar findings were reported by different studies indicating prescription errors as commonly perceived errors^{2,6,11} Among the different prescribing errors, omission of dose (53%) and frequency errors (14%) were the most frequently occurring errors. The consequences of prescribing errors may lead to a reduced probability of effective treatment being timely or increase in risk of harm among patients due to drug related adverse effects or drug interactions. During the study period, frequency of medication administration errors was found to be 29.59%. In many studies, the frequency of medication administration errors ranges from 14 to 46 %.^{2,10,9} The higher incidence of medication administration error occurs results in higher chances of morbidity and mortality in the patients.⁸ Some recommendation for reducing prescribing error and administration error, like improving the prescription writing skill and give some training to nursing staff and pharmacist regarding prescription at regular interval, follow the correct prescribed format, Prescriber should include age, gender, weight, diagnosis and other demographics of the patients on the prescription and medicine chart. The nurse has to check the proper route of the drug administration like IV, IM, SC. Prescription analysis was done for determining the presence of interacting drugs. During the study, 95 prescriptions (48%) had the presence of potential drug interactions. The majority of drug interactions were minor (37; 18.87%) followed by a significant (30; 15.30%) and

serious (28; 14.28%). Whereas the study conducted by Karthikeyan M *et al.* reported 40.29% of drug-drug interaction.¹² Hence, awareness among prescribers regarding drug-drug interactions and frequent audit of prescription to avoid medication errors is required.

Prescription analysis by using Phadke's criteria, the majority of the prescriptions was semirational in medicine and surgery ward. Of the 400 prescriptions analyzed, based on Phadke's criteria, 178 (41.68%), 135 (31.61%) and 96 (22.48%) prescriptions were rated as rational, semirational and irrational, respectively. A study done by Mira Desai *et al.* observed 31% irrational prescription which is more as compare to our results.² According to our finding irrational prescriptions had more number of medication errors so the prescribing pattern also affect the medication errors. Further, 13 serious drug interactions were reported with levofloxacin and Ondansetron. However, their potential to cause serious DDI has been neglected by prescribers. This calls for educating prescribers regarding DDI and undertaking prescription audit on a regular basis. Hence, it requires to create awareness among prescribers regarding drug-drug interactions and frequent audit of prescription to avoid medication errors.

The severity level assessment of medication error that majority of belonging to the category error, no harm which comes under category C 118 (60.20%) and category B 44 (22.44%) followed by 34 (17.34%) in category no error which comes under the category A. This finding consistent with the study carried out by Sanjay Sharma *et al.*¹ showed that majority of error comes under category C (103; 61%) followed by Category B (47; 28%) and category A (13; 7%).

Limitations

We cannot perform any reconciliation procedure to resolve the medication errors. We could not assess the actual impact of drug interaction and while assessing rationality, the clinician's point of viewpoint was not taken in to consideration, which could have been different than our observations.

CONCLUSION

The study concludes that the overall incidence of medication error was found to be 45.90%. The rate of prescribing error was higher than administration errors. The type of a prescribing error involved in the study was omission of drug dose and drug frequency prescribed. Omission error was mainly in administration errors. The study also shows the occurrence of medication error at each stage of medication use, along with semi-rational prescriptions and severity assessment of

medication errors. The result may be better evidence to the fact that the award based clinical pharmacist can prevent consequences related to medication.

ACKNOWLEDGEMENT

The authors are thankful to management of Dr. Jivraj Mehta Smarak Health Foundation for permitting us to perform our work and also for their support and cooperation.

CONFLICT OF INTEREST

The authors declared no conflict of interest.

ABBREVIATION USED

NCCMERP: National Coordinating Council for Medication Error Reporting and Prevention; **DDI:** Drug Drug Interaction; **SPSS:** Statistical analysis package for social sciences; **MEs":** Medication Errors; **PEs:** Prescribing Errors; **AEs:** Administration Errors.

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