

## Comprehensive Evaluation of Medication Error Incidence in a Tertiary Care Hospital

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Received: July 30, 2020; Revised August 18, 2020; Accepted August 20, 2020

### ABSTRACT

**Background:** Medication errors are any preventable event that may cause patient harm while the medication is in control of healthcare professional. Medication reconciliation is a process of active monitoring to reduce the severity of sequelae due to unintended medication errors. The objectives are to assess the incidence of medication errors, to evaluate percentage of error prone abbreviations, to assess the incidence of adverse drug reactions.

**Methods:** A cross-sectional observational study was conducted for a period of 6 months February to July 2019. A systematic monitoring was done by the clinical pharmacist during regular ward rounds on medication errors, error prone abbreviations, and adverse drug reactions for all the drugs. The data was collected by examining patient's case files using Medication reconciliation forms as a tool and data interpretation was done using Microsoft Excel 2010.

**Results:** A total of 4721 prescriptions were analysed, among which 254 medication errors were encountered (5.38%). On categorizing the same, it was observed to have 71 (27.95%) prescription errors, 5 (1.97%) administration errors, 124 (48.82%) transcription errors, 11 (4.33%) dispensing errors, 11 (4.33%) monitoring errors and 14 (5.51%) drug duplications. Apart from medication errors, 18 (0.38%) Error Prone Abbreviations and 18 (0.38%) adverse drug reactions were also noted.

**Conclusion:** Medication errors can be prevented by giving attention to the medication therapy and increased involvement of clinical pharmacists in the provision of pharmaceutical care, results in improved patient outcomes and an overall reduction in health care costs. Hence Pharmacist collaborating with other health care providers will further improve patient safety.

**Keywords:** Medication errors, Transcription errors, Prescription errors, Error prone abbreviations, Adverse drug reactions

### INTRODUCTION

Medication error is defined as “any preventable 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, or consumer” [1]. Errors can occur in any stage in the sequence of medication use. Errors happen due to lack of knowledge, poor performance and psychological lapses [2, 3]. It arises when an action is anticipated but not performed [4].

Medication errors can be understood based on various classifications as contextual, modal or psychological [5]. This study classifies errors based on the stages of medication use process, such as prescribing, administration, transcribing, dispensing and monitoring **Table 1**.

Error prone abbreviations are another significant source of medication error contributed by the use of inappropriate abbreviations in prescriptions. It is a malpractice frequently causing harm to the patients [10]. The incidence of error prone

abbreviations is higher in handwritten prescriptions when compared to the electronic ones. In developing countries standardizing acceptable abbreviations is necessary to eliminate error prone abbreviations [11].

An Adverse drug reaction (ADR) is an unwanted or harmful response experienced following the administration of a drug or a combination of drugs under normal conditions of use. It is suspected to be related to the drug and medication errors may

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**Citation:** Neena PEM, Naveen KP, Thayub M, Singh DS & Cherian KM. (2020) Comprehensive Evaluation of Medication Error Incidence in a Tertiary Care Hospital. J Pharm Health Sci Res, 1(1): 25-30.

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**Table 1.** Definition of types of medication errors.

Error	Definition
Prescribing Error	Errors in the act of writing the prescription or prescribing faults encompassing erroneous medical decisions resulting in harm to patients [6].
Administration Error	Difference between the drug received by the patient and the drug therapy intended in the medication order [7].
Transcription Error	Error occurring while transcribing the medication order from one source to the other, majorly made by human operators.
Dispensing Error	Discrepancy between the prescription and the medicine delivered by the pharmacy to the patient or ward. It also includes dispensing medicines of inferior quality [8].
Monitoring Error	Failure to perform a thorough monitoring of the patients response to the corresponding drugs administered.
Drug Duplication	Error of prescribing multiple medications for the same indication or purpose [9].

Medication misadventure can happen anywhere in the healthcare system and it is a threat to effective patient care. The sequelae of an unintended medication error may include iatrogenic adverse drug reaction, prolonged hospital stay, morbidity or even death [13]. Clinical pharmacists can have a significant impact on reducing healthcare costs, as they have the expertise to detect, resolve, and prevent medication errors and medication-related problems, promoting efficient patient care.

The primary objectives of this study are to assess the incidence of medication errors, to evaluate percentage of error prone abbreviations, to assess the incidence of adverse drug reactions.

## METHODOLOGY

A cross-sectional observational retrospective study was conducted for a period of 6 months (Feb- July 2019) in an inpatient setting of Frontier Lifeline Hospital, Chennai.

### Study Criteria

#### Inclusion

- Patients of both genders
- Included all age group of patients
- Patient admitted in Inpatient department

#### Exclusion

- Outpatient department patients.

**Study tools:** Medication reconciliation forms were used as a tool to document all the error data.

## STUDY PROCEDURE

A systematic monitoring was done by the clinical pharmacist during daily ward rounds on medication errors, error prone abbreviations, adverse drug reactions for all drugs and special attention was given for high risk medications, look alike sound alike drugs, restricted antimicrobial and narcotics. The data was collected on examining patient's case files and on analyzing laboratory investigations, drug chart and daily doctor's progress report. All the error data were documented

using medication reconciliation form and the same was submitted to the quality improvement. The data was analyzed using Microsoft Excel 2010.

## RESULTS

We reviewed 4721 medication orders and found 254 medication errors (5.38%), 18 error-prone abbreviations (0.38%), 18 adverse drug reactions (0.38%).

### TYPES OF MEDICATION ERRORS

A total of 4721 prescriptions were analysed, among which 254 medication errors were encountered (5.38%). On categorizing the same, it was observed to have 71 (27.95%) prescription errors, 5 (1.97%) administration errors, 124(48.82%) transcription errors, 11(4.33%) dispensing errors, 11(4.33%) monitoring errors, 14 (5.51%) drug duplications and 18 (7.09%) error-prone abbreviations as mentioned in **Figure 1, Table 2.**

Out of 4721 medication orders we found 254 medication errors (5.38%) in a span of 6 months. During the study duration the highest incidence of medication errors were observed in April and the lowest in July as seen in **Figure 2, Table 3.**

### ERROR PRONE ABBREVIATIONS

We reviewed 254 medication errors and found 18 Error-prone Abbreviation (0.38%) in a span of 6 months of which we found highest percentage of medication error-prone abbreviations in February and lowest percentage of medication error-prone abbreviations in July as depicted in **Figure 3 and Table 4.**

We reviewed 4721 medication orders of which 18 (0.38%) adverse drug reactions were found in a span of 6 months. Highest percentage of adverse drug reactions were observed in July and followed by April, and lowest was seen in May as in **Figure 4, Table 5.**

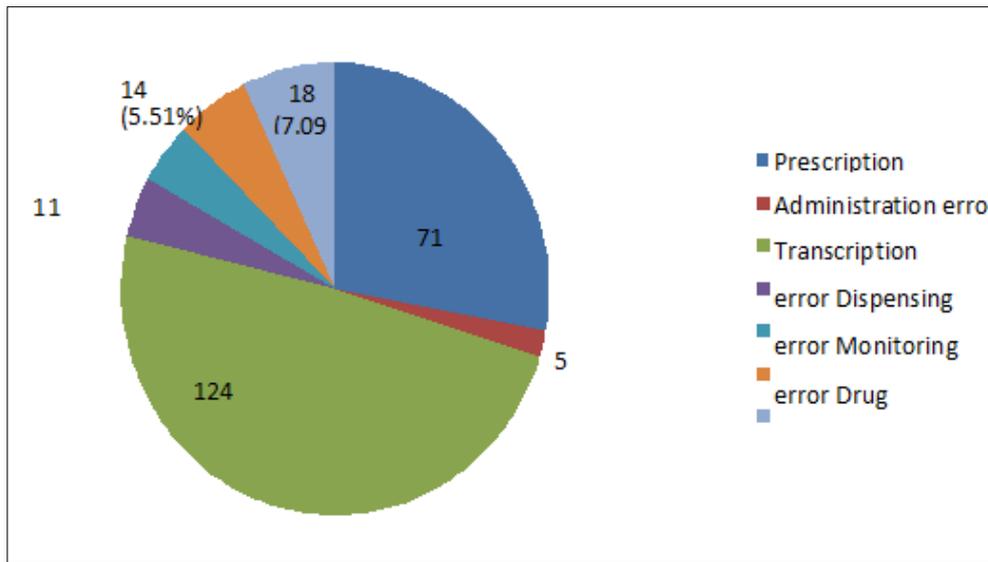


Figure 1. Incidence of types of medication errors.

Table 2. Incidence of types of medication errors month-wise.

S.No	Types of Errors	Feb	Mar	April	May	June	July
1	Prescription	7	11	15	13	18	7
2	Administration	1	0	0	2	2	0
3	Transcription	16	32	31	21	9	15
4	Dispensing	0	4	6	1	0	0
5	Monitoring	0	0	2	3	2	4
6	Drug duplication	1	2	6	2	1	2
7	Error-prone abbreviations	8	2	3	4	1	0
	<b>TOTAL</b>	<b>33</b>	<b>51</b>	<b>63</b>	<b>46</b>	<b>33</b>	<b>28</b>

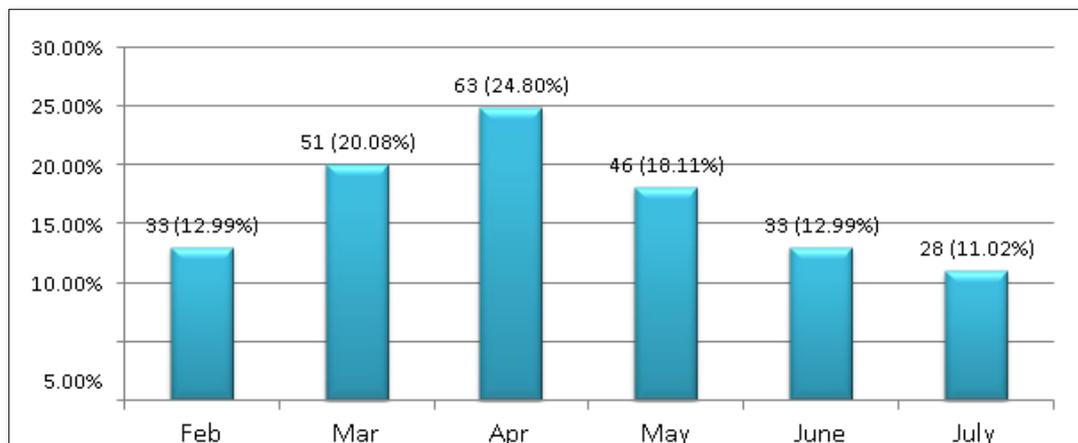
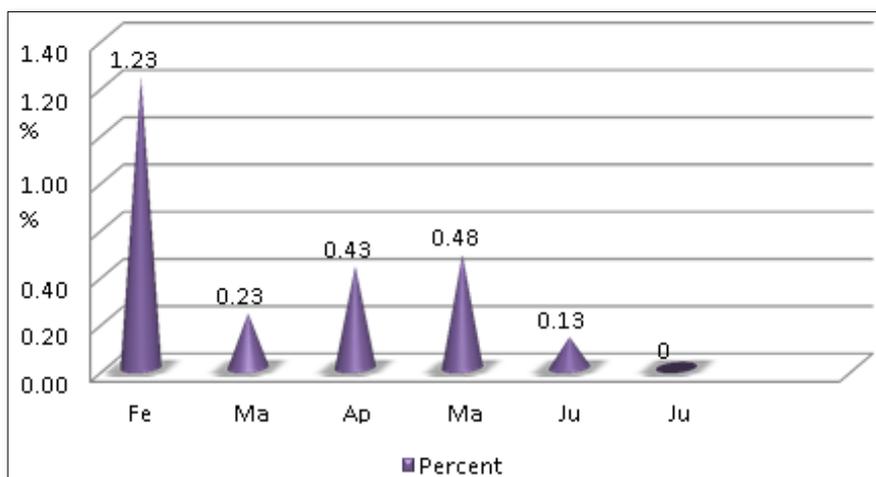


Figure 2. Incidence of medication errors month-wise.

**Table 3.** Incidence of medication errors based on patients per month.

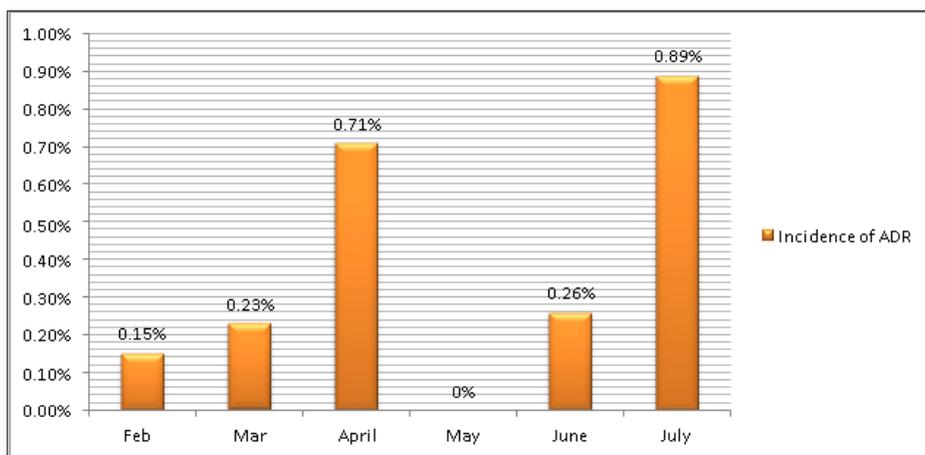
S.No	Month	Feb	March	April	May	June	July
1	Sample size	652	885	702	834	753	753
2	Total errors	33	51	63	46	33	28
3	Inpatient days	950	1231	1178	1231	1257	1397
4	Percentage (%)	5.0	5.7	8.9	5.5	4.3	3.1



**Figure 3.** Incidence of Error-prone abbreviations.

**Table 4.** Percentage of Error-prone abbreviations.

S.no	Month	Feb	March	April	May	June	July
1	Sample size	652	885	702	834	753	895
2	Errors	8	2	3	4	1	0
3	Percentage (%)	1.23	0.23	0.43	0.48	0.13	0



**Figure 4.** Incidence of Adverse drug reactions.

## ADVERSE DRUG REACTIONS

**Table 5.** Percentage of Adverse drug reactions.

S.no	Month	Feb	March	April	May	June	July
1	Sample size	652	885	702	834	753	895
2	ADRs	1	2	5	0	2	8
3	Percentage (%)	0.15	0.23	0.71	0	0.26	0.89

## DISCUSSION

Medication errors have the potential to cause harm in the patients hence it's monitoring and assessment is an important task to promote healthcare. Unfortunately, there is a huge gap in monitoring the medication errors globally and specifically in India. With that as consideration, this study was conducted to assess the type and frequency of medication errors in a tertiary care hospital in Chennai [14]. Our study reported higher incidence of transcription errors 124 (48.82%) similar to the study of **Lisby M et al.**, The process of transcribing a drug order manually from one sheet is a significant source of error due to negligence and omission. Transcription errors can potentially compromise patient outcomes [15-17]. Prescribing errors 71 (27.95%) were the most frequent category of medication errors occurred in patients followed by administration errors. High rate of prescribing errors might be due to peak hour and patient load leading to lack of attention by the healthcare team, which could affect the patient treatment, increase the hospital stay, and further cause an economic burden to hospital as well as patients [18].

In this study we also aimed to observe the use of error-prone abbreviations and other inappropriately used abbreviations in prescriptions. A total of 18 (0.38%) error-prone abbreviations were noted in the study. Pharmacists who are involved in interpreting prescriptions should explain that this erratic use of abbreviations may lead to medication errors. Even though the incidence is very less, eradicating error-prone abbreviations is important to avoid the effects of preventable medication errors [19, 20]. Advancing technology to use electronic prescription has greatly reduced this problem [21-24]. In developing countries hospitals that use hand-written prescriptions should inform prescribers of this danger and develop in-house error-prone abbreviations list for their guidance and promote, the use of standardised, acceptable abbreviations. This fact is supported by studies of **Samaranayake NR et al.**, and **Miasso AI et al** [25-28].

It was observed that 18 (0.38%) adverse drug reactions were seen during the study. Medication errors are strong risk factors for preventable adverse drug events or reactions, strategies have to be made for their reduction [29-32]. Such strategies include ensuring that all persons involved in the medication process i.e. the physicians; nurses and pharmacists must have good pharmacological knowledge, computerisation of the

entire medication process, and the engagement of a sufficient number of clinical pharmacists on the wards to monitor the same. This was supported by **M Alshakka et al.**

## CONCLUSION

Medication errors can be prevented by giving attention to the medication therapy and increased involvement of clinical pharmacists in the provision of pharmaceutical care. It results in improved patient outcomes and an overall reduction in health care costs. The incidence of medication errors can be overcome by educating physicians, nurses and other healthcare professionals regarding the areas where medication errors are prone to occur and develop strategies to avoid the same.

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