ASIAN JOURNAL OF PHARMACEUTICAL AND CLINICAL RESEARCH

INNOVARE ACADEMIC SCIENCES
Knowledge to Innovation

Vol 17, Issue 4, 2024

Online - 2455-3891
Print - 0974-2441

Research Article

A RETROSPECTIVE STUDY ON SEVERITY AND ASSESSMENT OF MEDICATION ERRORS IN A TERTIARY CARE TEACHING HOSPITAL

UMAMAHESWARA RAO K, ANUHYA P, SUCHARITHA J, SAI KIRAN A

Department of Pharmacology, Sri Venkateswara Institute of Medical Sciences, Tirupati, Andhra Pradesh, India.
***Corresponding author: Umamaheswara Rao K; Email: kavetimahesh40@gmail.com**

Received: 04 November 2023, Revised and Accepted: 30 December 2023

ABSTRACT

Objectives: This study mainly aims to assess the severity and occurrence of medication errors (MEs) in a Tertiary Care Teaching Hospital and suggest solutions for reducing MEs.

Methods: It is a retrospective study of patients receiving medication during treatment. The techniques used during this study to identify MEs are direct observation of patients, daily review of medication charts by clinical pharmacists, daily audit of prescriptions, and using medication administration records.

Results: The study revealed that the majority of MEs fall under the age groups of 51–60 (45), 41–50 (40), 61–70 (31), 31–40 (19), 21–30 (17), 71–80 (16), 81–90(7), 11–20(6), 1–10(3), and 91–100 (1), respectively. Among 185 patients, males were 100 and females were 85, indicating that MEs occurred more in males than females, and the personnel involved in MEs were more nurses than physicians.

Conclusion: By assessing the severity and occurrence of MEs, we identified the most common risk factors for the occurrence of MEs. The study concludes that educating nurses, implementing an evidence-based treatment strategy, and fostering communication and collaboration among hospital pharmacists, doctors, and nurses can help to decrease the occurrence of MEs.

Keywords: National coordinating council for medication error reporting and prevention, Clinical pharmacist, Medication safety, Medication errors.

 DOI: http://dx.doi.org/10.22159/ajpcr.2024v17i4.49799. Journal homepage: https://innovareacademics.in/journals/index.php/ajpcr

INTRODUCTION

Medications may treat a specific disease or symptom ineffectively or inappropriately. The prescribing doctor must be thoroughly informed about the dosage of a medication to guarantee its safety and effectiveness [1].

- Recognizing and reporting medication errors (MEs) can be challenging for healthcare providers because of many factors, such as a heavy workload, a lack of training and education, a lack of knowledge on the usefulness of reporting MEs, and a lack of information on how to report MEs. These are various barriers that lead to under-reporting of MEs by health-care providers [2].
- The National Coordinating Council for ME Reporting and Prevention (NCC MERP) defines ME 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.
- MEs may occur during prescribing, transcribing, dispensing, and administering the drugs. These errors can be related to health-care products, systems, procedures, and professional practices, such as order communication, compounding, distribution, administration, labeling, packaging, and prescribing [3].
- Irrational medicine use is the primary cause of pharmaceutical errors and medication-related issues in India; official statistics indicate that up to 5.2 million medical errors occur there each year.

The main reason for pharmaceutical errors is inadequate prescribing practices. Prescribing errors mostly occur due to illegible handwriting; computerized prescriptions may help reduce this risk of prescribing. More research is needed to determine how these systems impact patient outcomes [4].

A clinical pharmacist can play a critical role in the health-care team as one of the medical specialists. By recognizing and averting pharmaceutical errors, adverse events at a hospital can be reduced [5].

Categories of ME according to the NCC MERP

- Category A: Circumstances or events that can cause an error.
- Category B: An error has occurred, but did not reach the patient.
- Category C: An error has occurred that reached the patient but did not cause harm to the patient.
- Category D: An error has occurred that reached the patient and required monitoring to confirm that it resulted in no harm to the patient and, or required intervention to preclude harm.
- Category E: An error has occurred that may have contributed to or resulted in temporary harm to the patient and required intervention.
- Category F: An error has occurred that may have contributed to or resulted in temporary harm to the patient and required initial or prolonged hospitalization.
- Category G: An error may have contributed to or resulted in permanent patient harm.
- Category H: An error has occurred that requires the intervention necessary to sustain life.
- Category I: An error has occurred that may have contributed to or resulted in the patient's death [6,7].

Aims and objectives

Tha aim of the study was to assess the severity and occurrence of MEs in a Tertiary Care Teaching Hospital and suggest solutions for reducing MEs.

METHODS

Study procedure

The MEs were collected over, for nearly 2 years in Tertiary Care Hospital at Sri Venkateswara Institute of Medical Sciences.

The techniques that were used to identify the MEs are listed below:

- Direct observation.
- Daily review of medicine chart by clinical pharmacist
- Daily audit of prescription
- Medication administration record.

Table 1: Distribution of patients with medication errors according to age group

Age group	Count (n=185)	Total%
1–10	3	1.62
11–20	6	3.24
21–30	17	9.18
31–40	19	10.27
41–50	40	21.62
51–60	45	24.32
61–70	31	16.75
71–80	16	8.24
81–90	7	3.78
91–100	1	0.54

Table 2: Gender-wise distribution of medication errors

Gender wise distribution	Count (n=185)	Total %
Male	100	54.05
Female	85	45.94

Table 3: Department medication errors

S. No.	Departments	Count (n=185)	Total %
1	Cardiology	11	5.94
2	Cardio thoracic	3	1.62
3	Cardio thoracic recovery room	1	10.54
4	Emergency room	24	12.97
5	Emergency ICU	6	3.24
6	Endocrinology	3	1.62
7	Gastroenterology recovery room	2	1.08
8	General surgery	6	3.24
9	Medicine	34	18.37
10	Medicine intensive care unit	4	2.16
11	Medical oncology	7	3.78
12	Nephrology	22	11.89
13	Neurology	8	4.32
14	Neuro Surgery	2	1.08
15	Obstetrics	9	4.86
16	Plastic surgery	3	1.62
17	Respiratory intensive care unit	2	1.08
18	Radiation oncology	13	7.02
19	Surgical gastroenterology	7	3.78
20	Surgical oncology	16	8.64
21	Special rooms	1	0.54
22	Urology	1	0.54

Study design
Retrospective study.

Sample size
185 MEs occurred in patients.

Study period
2 years (January 2021–December 2022).

Inclusion criteria
MEs occurred in patients admitted to the hospital.

Exclusion criteria
The following criteria were excluded from the study:

- Patients were omitted during the periods of dialysis.
- OPD patients were not included in this study.

Ethical committee approval
Approval number–IEC No.1476.

Table 4: Details of NCCMERP categorization of medication errors

NCC MERP Categories	Count (n=185)	Total%
Category A (Circumstances or events that can capacity to cause error)	00	00
Category B (An error occurred, but the medication did not reach the patient)	73	39.45
Category C (An error occurred that reached the patient but did not cause patient harm)	112	60.54
Category D (An error occurred that resulted in the need for increased patient monitoring but no patient harm)	00	00
Category E (An error occurred that resulted in the need for treatment or intervention and caused temporary patient harm)	00	00
Category F (An error occurred that resulted in initial or prolonged hospitalization and caused temporary patient harm)	00	00
Category G (An error occurred that resulted in permanent patient harm)	00	00
Category H (An error occurred that resulted in a near-death event)	00	00
Category I (An error occurred that resulted in patient death)	00	00

Table 5: Types of medication errors

Type of errors	Count (n=185)	Total %
Prescribing errors	11	5.94
Transcribing error	2	1.08
Dispensing errors	00	00
Administration errors	172	92.97
Monitoring errors	00	00

Table 6: Details of contributing/risk factors for medication errors

Causes	Count (n=185)	Total%
Illegible handwriting	1	0.54
Work procedure failure	180	97.2
Heavy workload	2	1.08
Incorrect drug/dosage	1	0.54
Incorrect computer category	1	0.54

Statistical analysis
Errors were expressed in percentages. They were so, continuing with the descriptive analysis with the help of the median to find the number of differences in error rates between the last 2 years' errors. All statistical analysis was carried out using Microsoft Excel.

RESULTS AND DISCUSSION

Retrospective data were collected for a period of 2 years, from January 2021 to December 2022, in all IP departments at a tertiary care hospital in Tirupati.

A total of 185 MEs occurred during the study period. Based on data collected from 185 patients 100 (54.05%) patients were male, and 85 (44.94%) patients were female. In the study, the age groups of 51–60 (24.32%) and 41–50 (21.62%) had the highest percentage of errors.

Age group distribution
Fig. 1 shows the majority of MEs fall under the age group of 51–60 is 45 (24.32%), 41–50 is 40 (21.62%), 61–70 is 31 (16.75%), 31–40 is 19 (10.27%), 21–30 is 17 (9.18%), 71–80 is 16 (8.24%), 81–90 is 7 (3.78%), 11–20 is 6 (3.24%), 1–10 is 3 (1.62%), and 91–100 is 1 (0.54%), respectively.

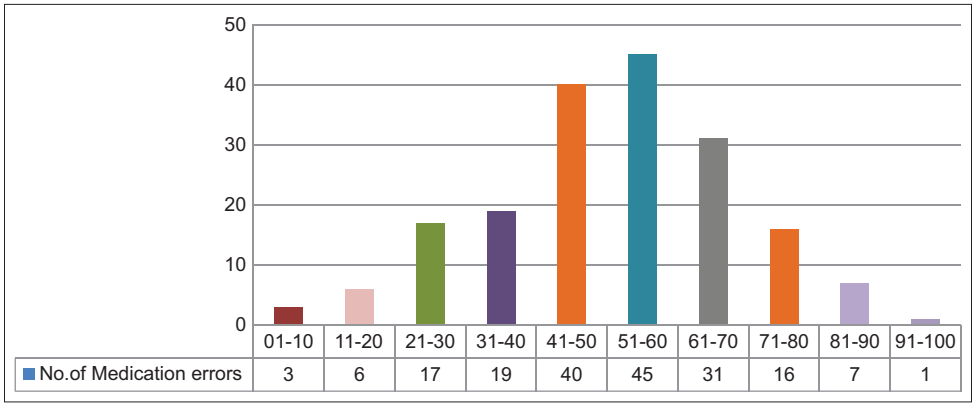

Fig. 1: Age group distribution

Gender-wise distribution

Fig. 2 shows that out of 185 patients, the highest number were males, followed by females, that is, 100 (54%) and 85 (46%), respectively.

Departments

Fig. 3 shows that in 185 patients most occurred MEs are from the department medicine 34 (18.37%), followed by Emergency room 24 (12.97%), Nephrology 22 (11.89%), Surgical oncology 16 (8.64%), Radiation oncology 13 (7.02%), Cardiology 11 (5.94%), Obstetrics 9 (4.86%), Neurology 8 (4.32%), Surgical Gastroenterology 7 (3.78%), Medical oncology 7 (3.78%), General surgery 6 (3.24%), Emergency ICU 6 (3.24%), Medicine intensive care unit 4 (2.16%), Plastic Surgery 3 (1.62%), Endocrinology 3 (1.62%), Cardio Thoracic 3 (1.62%), Respiratory intensive care unit 2 (1.08%), Neuro Surgery 2 (1.08%), Gastroenterology recovery room 2 (1.08%), Urology 1 (0.54%), Special rooms 1 (0.54%), and Cardio Thoracic Recovery Room 1 (0.54%), respectively.

MEs based on NCCMERP categories

Fig. 4 shows that among all NCCMERP categories, the percentage of Category B–73 (39.45%) and Category C–112 (60.54%).

Types of MEs

Fig. 5 among all types of MEs, administration errors accounted for 172 (92.97%), prescribing errors accounted for 11 (5.94%), and transcribing errors accounted for 02 (1.08%).

Contributing or risk factors for MEs

Fig. 6 shows that among the 185 patients, the most common MEs occurred due to work procedure failure (180) (97.2%), followed by heavy work load 2 (1.08%), illegible handwriting 1 (0.84%), incorrect drug or dose 1 (0.84%), and incorrect computer category 1 (0.84%).

Personnel involved in MEs

Fig. 7 shows that among 185 patients, most MEs were caused by nurses (174%) and physicians 11 (5.94%).

Medication mistakes were quickly fixed by analyzing the problem and its root cause. It took a careful assessment of the underlying problem to manage the pharmaceutical error. Understanding the kind and degree of error can help lower the rate of drug errors at that specific level, producing a more favorable result overall. Although our hospital implements an electronic prescribing system and has also incorporated clinical pharmacists into patient care, MEs reporting was particularly high compared with other studies in the region. Although our hospital implements an electronic prescribing system and has also incorporated clinical pharmacists into patient care, MEs reporting was particularly high compared with other studies in the region. Although our hospital implements an electronic prescribing system and has also incorporated clinical pharmacists into patient care, MEs reporting was particularly

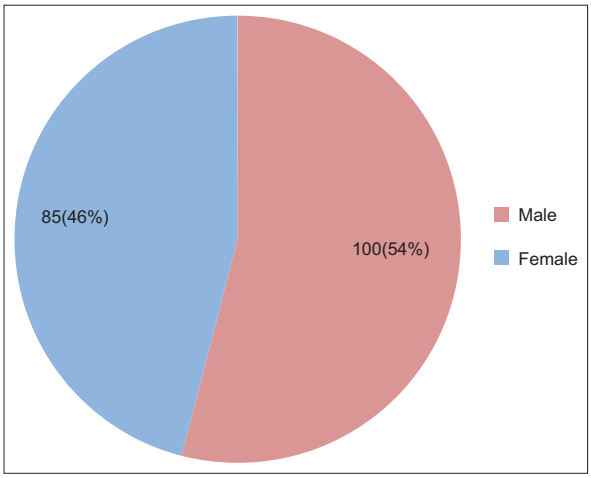

Fig. 2: Gender-wise distribution

Table 7: Occurrence of medication errors

Medication errors occurred	Count (n=185)	Total%
Physicians	11	5.94
Nurses	174	94

high compared with other studies in the region although our hospital implements an electronic prescribing system and has also incorporated clinical pharmacists into patient care, MEs reporting was particularly high compared with other studies in the region medication mistakes were quickly fixed by analyzing the problem and its root cause. It took a careful assessment of the underlying problem to manage the pharmaceutical error. Understanding the kind and degree of error can help lower the rate of drug errors at that specific level, producing a more favorable overall result.

185 patients with MEs were distributed according to their age, and the number of errors in that particular age group was also distributed. The highest number of MEs was found in the age group of 51–60: 45 (24.32%), 41–50: 40 (21.62%), 61–70: 31 (16.75%), 31–40: 19 (10.27%), 21–30: 17 (9.18%), 71–80: 16 (8.24%), 81–90: 7 (3.78%), 11–20: 6 (3.24%), 1–10: 3 (1.62%), and 91–100: 1 (0.54%). There were some critical limitations to this study. First, we have sensitized all the stakeholders regarding MEs. All nurses were invited to attend a program regarding ME reporting, lasting for 30 min, in which details of the data collected from that particular department were shared. The problems in the medication process, with examples of cases from our observation, were described. Interventions are designed to help with complexity reduction, training, and knowledge improvement. Second,

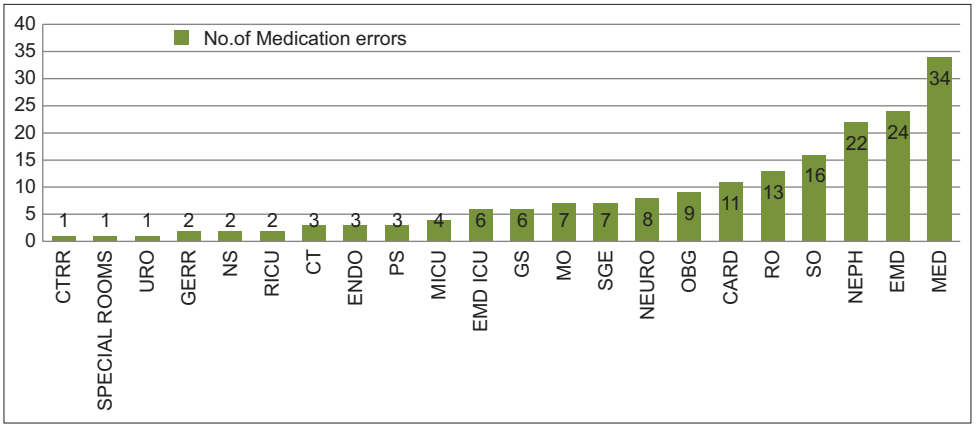

Fig. 3: Department-wise medication errors occurred

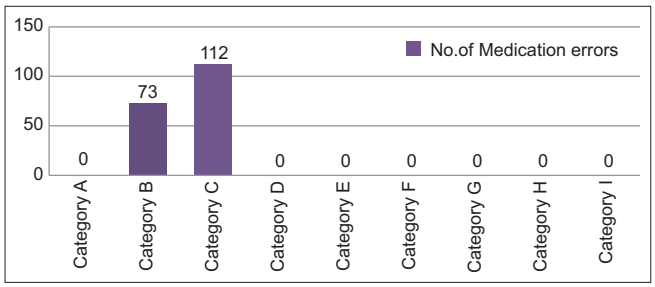

Fig. 4: National Coordinating Council for Medication Errors Reporting and Prevention categorization

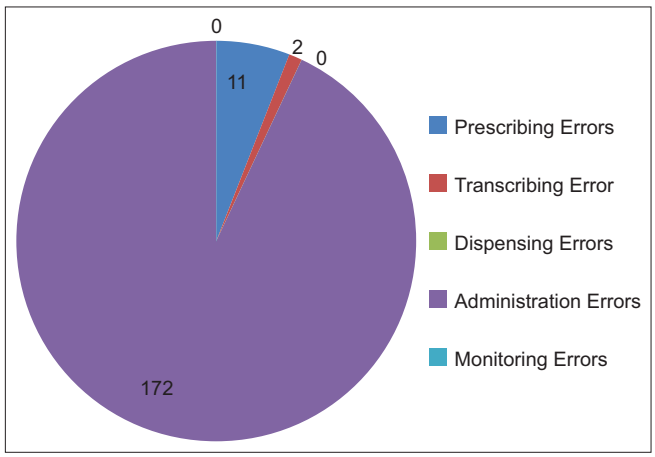

Fig. 5: Types of medication errors

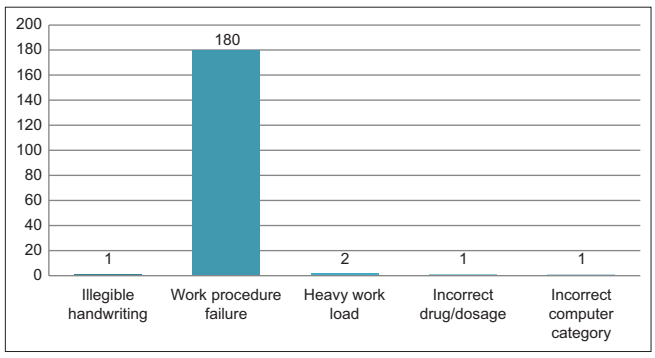

Fig. 6: Contributing/risk factors for medication errors

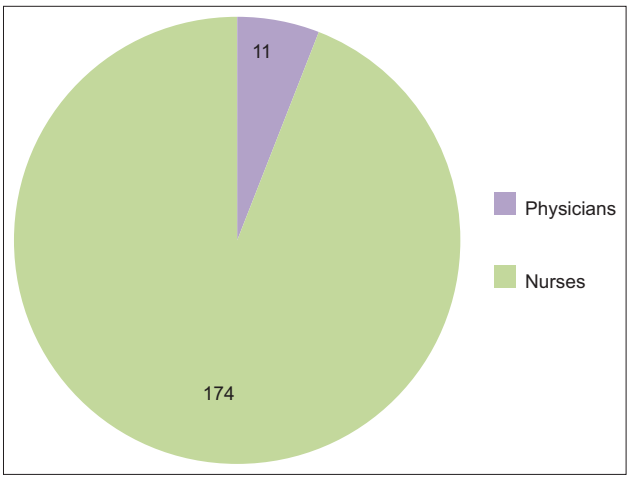

Fig. 7: Details of personnel involved in medication errors

we have invented the Blame-free ME reporting tool and sensitized nurses about the blame-free ME reporting tool for continuous reporting of MEs in ICUs and wards, and we encouraged doctors and nurses to report MEs as it would help in planning appropriate strategies to tackle the problem and included corrective action and preventive action for root cause analyses of the MEs, which would have provided a greater insight into the MEs and used for developing preventative strategies.

CONCLUSION

By assessing the severity and occurrence of MEs, we identified the most common risk factors for their occurrence. The study's conclusions indicate that educating nurses, implementing an evidence-based treatment strategy, and fostering communication and collaboration among hospital pharmacists, doctors, and nurses can all help to lower the incidence of prescription errors.

AUTHORS' CONTRIBUTIONS

All the authors have prepared the conception, data collection, data analysis, interpretation, and drafting of the article, discussed the methods and results, and contributed to the final manuscript. Dr. K. Umamaheswara Rao supervised the whole work until the completion of the manuscript.

ACKNOWLEDGMENT

The authors are thankful to the management of the hospital for their help. The authors are also thankful to all the participants for being a part of this study.

CONFLICTS OF INTEREST

There are no conflicts of interest, financial, or otherwise.

AUTHORS' FUNDING

This research received no external funding.

REFERENCES

1. Bates DW, Cullen DJ, Laird N, Petersen LA, Small SD, Servi D, *et al*. Incidence of adverse drug events and potential adverse drug events. Implications for prevention. ADE prevention study group. JAMA. 1995 Jul 5;274(1):29-34. doi: 10.1001/jama.1995.03530010043033, PMID 7791255
2. Rodziewicz TL, Houseman B, Hipskind JE. Medical error reduction and prevention. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2023.
3. Devine EB, Wilson-Norton JL, Lawless NM, Hazlet TK, Hansen R, Kelly K, *et al*. Preparing for ambulatory computerized prescriber order entry by evaluating preimplementation medication errors. In: Henriksen K, Battles JB, Marks ES, Lewin DI, editors. Advances in Patient Safety: From Research to Implementation (Volume 2: Concepts and Methodology). Rockville, (MD): Agency for Healthcare Research and Quality US; 2005.
4. Billstein-Leber M, Carrillo CJ, Cassano AT, Moline K, Robertson JJ. ASHP guidelines on preventing medication errors in hospitals. Am J Health Syst Pharm. 2018 Oct 1;75(19):1493-517. doi: 10.2146/ajhp170811, PMID 30257844
5. Sinha G, Acharya LD, Tunga G, Mathews T. A study of medication errors in general medicine wards of the South Indian tertiary care hospital. Asian J Pharm Clin Res. 2016 Jul;9(4):196.
6. The National Coordinating Council for Medication Error Reporting and Prevention; 2005 Dec. Available from: https://www.nccmerp.org [Last accessed on 2010 Nov 08].
7. Patel N, Desai M, Shah S, Patel P, Gandhi A. A study of medication errors in a tertiary care hospital. Perspect Clin Res. 2016 Oct-Dec;7(4):168-73. doi: 10.4103/2229-3485.192039, PMID 27843792