

**MEDICATION ERRORS: AN OVERVIEW**

**Sara Yeldhos\*, Anjana Baby, Jasmy E. S., Sharon Ann Varghese,  
Megha Anna Varghese and Priyanka S.**

Department of Pharmacy Practice, Karpagam College of Pharmacy, S.F.762, Pollachi Main Road, Othakkalmandapam, Coimbatore-641032, Tamil Nadu, India (Affiliated to The Tamil Nadu Dr. M.G.R Medical University).

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**\*Corresponding Author****Sara Yeldhos**

Department of Pharmacy  
Practice, Karpagam College  
of Pharmacy, S.F.762,  
Pollachi Main Road,  
Othakkalmandapam,  
Coimbatore-641032, Tamil  
Nadu, India (Affiliated to  
The Tamil Nadu Dr. M.G.R  
Medical University).

**ABSTRACT**

In healthcare system even a small error can lead to fatal or disastrous situations thus the scope of errors should be minimal. A medication error is 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. Such events may be related to professional practice, healthcare products, procedures and systems, including prescribing; order communication; product labelling, packaging, and nomenclature; compounding; dispensing; distribution; administration; education; monitoring; use. Medication errors are burden to economy and create hardship to common people. Medication errors are burden to economy and create hardship to common people. Annually the total cost of medication error related costs exceeds \$40 billion. Patients also go through phases of mental stress and trauma rather than the perceived financial hardship due to medication errors The pharmacist should accept the social mandate to

ensure the safe and effective drug therapy of an individual patient, only then the pharmacist reprofessionalization will be completed. The social responsibility should be accepted by the pharmacist to nurture and mature to prevent the drug related morbidity and mortality.

**KEYWORDS:** Medication error, Adverse drug reactions, healthcare system, morbidity pharmacist.

## INTRODUCTION

WHO defines a healthcare system more simply but more broadly as “all of the activities whose primary purpose is to promote, restore or maintain health”.<sup>[1]</sup> India’s healthcare system has widened in an prevailing taste and quite tremendous since independence. The major principles that paved the path of development during the 1947-83 were that (a) no one should be denied care based on inability to pay and (b) healthcare is the government’s responsibility.<sup>[2]</sup> In 1943 through Bhore committee, due to the socio-economic and health conditions government set up objectives to be achieved through the plan they were formulating.<sup>[3]</sup>

In healthcare system even a small error can lead to fatal or disastrous situations thus the scope of errors should be minimal. Pharmacovigilance establishment in India mainly focus on the clinical discipline and also has 30 centeres supported by world bank. Since 2005 this centers were examining the adverse reactions reports. All the centeres form a web including the regional and peripheral centers at medical colleges in several states and they gather and analyse the date and report to drug control general of India.<sup>[4]</sup> The practice of medication usage is incorporative method with a physician’s prescription proceed to a pharmacist cross checking and delivery of medications and ending with the nurses prepare and finally administration of drugs to patient. These numerous steps in the medication chain can leads to error and can lead to unwanted effects in patients.<sup>[5]</sup>

The National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) states that “A medication error is 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. Such events may be related to professional practice, healthcare products, procedures and systems, including prescribing; order communication; product labelling, packaging, and nomenclature; compounding; dispensing; distribution; administration; education; monitoring; use”.<sup>[6]</sup>

In patients with unknown or iatrogenic diseases medication errors are found to be main root. Overcrowding, poverty, ignorance are also likely the associate factors in developing countries.<sup>[7]</sup> Medication errors are common cause for sub optimal goals of pharmaceutical care which thereby cause failure of healthcare system. During hospital administration medication error can occur which thereby leads to futile money wastage, unwanted diagnostic procedures and can eventually lead to increased morbidity and mortality.<sup>[8]</sup>

## CLASSIFICATION OF MEDICATION ERRORS

Healthcare professionals are notified with medication errors, when the patient show illeffects due to administration of drugs if only the clinical consequences are significantly present. These consequences are sometimes disconcerted with adverse reactions. According to the World Health Organization (WHO, 1972), an adverse reaction is any harmful or undesirable effect presented after administration of medication at doses normally used for prophylaxis, diagnosis, or treatment of diseases. It is not possible to prevent adverse reactions, even though the possibility of an adverse reaction is known.<sup>[9]</sup>

According to WHO guidelines 2016; there are a number of different approaches to classifying medication errors. One approach is to base the classification on the stage in the sequence of medication use process, such as prescribing, transcribing, dispensing, administration or monitoring. Another approach is to consider the types of errors occurring, such as wrong medication, dose, frequency, administration route or patient. A further approach classifies errors according to whether they occur from mistakes made when planning actions (knowledge-based or rule-based mistakes) or errors in the execution of appropriately planned actions (action-based errors, known as “slips”, or memory-based errors, known as “lapses”). Errors may also be classified according to their level of severity. These approaches are not mutually exclusive and there is no strong evidence to support particular methods of defining or classifying errors specifically in primary care. The approach taken will depend on the setting and the purpose of the classification.<sup>[10]</sup>

The process of medication use is subdivided into five important stages:

1. Prescribing,
2. Dispensing,
3. Transcribing,
4. Preparing
5. Administering

Among all this prescribing and administering of medication are most susceptible class of medication errors. Medication errors are also widely classified into prescription error, dispensing-related error and errors-related to the administration of medication.<sup>[11]</sup>

Many studies suggest that prescribing errors 0.3–9.1% of medication orders written for hospital inpatients and in 1–100% of hospital admissions. Harm due to prescribing errors has been reported in approximately 1% of inpatients.<sup>[12]</sup>

Rajeev Shrestha et al conducted a retrospective, cross-sectional and quantitative study a total of 2448 drugs were prescribed in 770 prescriptions or patients. The average number of drugs per encounter was 3.2. The percentage of encounter with antibiotic and injection was 37.9% ( $n = 292$ ) and 0.7% ( $n = 5$ ), respectively. The percentage of drugs prescribed by generic and from an essential medicine list of Nepal was 2.9% ( $n = 72$ ) and 21.3% ( $n = 521$ ), respectively. The most common 32.5% of prescriptions contain three drugs and 24.7% of prescriptions contain four drugs. The average prescription errors per prescription were 3.4. Among total errors, omission errors related to prescriber were 1.5 ( $n = 1135$ ), omission errors related to the drug were 1.5 ( $n = 1189$ ) and commission errors were 0.3 ( $n = 269$ ). The total of 249 drug interactions were found in 19.1% ( $n = 147$ ) prescriptions. The common prescription errors were due to failure to mention prescriber name 87.5% ( $n = 674$ ), failure to mention prescriber signature 19.2% ( $n = 148$ ) and failure to mention diagnosis 39.2% ( $n = 302$ ).<sup>[13]</sup>

Kistner et al in his study conducted of the 9846 prescriptions filled, 1229 (12.5%) contained a total of 1371 errors. Of these errors, 155 (1.6%) were potentially serious. found no correlation between the number of prescriptions dispensed per hour and the total number of errors made, although error peaks were noted during the lunch hour and in the hour before closing.<sup>[14]</sup>

Zeray Baraki, et al in his A prospective observational based cross sectional study, total of 1251 medication administrations were observed from 1251 patients. The occurrence of medication administration error was 62.7% with 95% CI (59.6%, 65.0%), wrong dose being the most common type of medication administration error with an occurrence rate of 53.7%.<sup>[15]</sup>

### CAUSES OF MEDICATION ERRORS

In a data report indicates that pharmacists perceived the following as causative factors for medication errors.

- Too many telephone calls (62%)
- Overload/ unusually busy day (59%)
- Too many customers (53%)
- Lack of concentration (41%)

- No one available to double check (41%)
- Staff shortage (32%)
- Similar drug names (29%)
- No time to counsel (29%)
- Illegible prescription (26%)
- Misinterpreted prescription (24%).<sup>[16]</sup>

### **MEDICATION ERROR REPORTING**

Detect and report any medication error encountered;

- I. Reportable events include both actual errors and the errors that have been detected and corrected before reach the patient.
- II. Document and report immediately after detected the error in accordance to the standard process/ work flow of the facilities.<sup>[17]</sup>

Elden NM, et al conducted a study on the importance of medication errors reporting in improving the quality of clinical care services Medication errors were higher during ordering/prescription stage (38.1%), followed by administration phase (20.9%). About 45% of errors reached the patients: 43.5% were harmless and 1.4% harmful. 7.7% were potential errors and more than 47% could be prevented. After the intervention, error rates decreased from (6.7%) to (3.6%) ( $P \leq 0.001$ ).<sup>[18]</sup>

### **APPROACHES FOR EFFECTIVE MEDICATION ERROR REPORTING**

- Alerting the demand of medication safety at local and national level by legitimize the need for MER systems.
- By attaining international and governmental support along with political will for the development and implementation of actions.
- Creating or reforming legislation and national regulations, guidelines and strategies to support MER;
- Designing proper tool, organization for coordinating and lead MER with sufficient human and capital fundings.
- Establishing and encouraging systems for safety culture of medication handling and reporting.<sup>[19]</sup>

## IMPACT OF MEDICATION ERRORS IN HEALTHCARE SYSTEM

No accurate values are present for prevalence and incidence rate of medication errors as it varies from study to study.<sup>[20]</sup> In India about 7000 mortalities per year have been reported due to medication errors. In our country the medication errors and medication related problems are mainly due to irrational use of medications.<sup>[21]</sup>

Studies pointed the rate of medication error was 42.1%<sup>[22]</sup>, (36%)<sup>[23]</sup>, 9.5%<sup>[24]</sup> and (28.3%).<sup>[25]</sup> Binu et al conducted a study to detect and evaluate the incidence of medication errors in a tertiary care hospital in 600 randomly collected prescriptions, 89 medication errors were detected. The study reveals that 14.3% medication error was found during the study duration.<sup>[26]</sup>

Medication errors are burden to economy and create hardship to common people. Annually the total cost of medication error related costs exceeds \$40 billion. Patients also go through phases of mental stress and trauma rather than the perceived financial hardship due to medication errors. The final outcome of medication error is non compliance which leads to mistrust in healthcare system.<sup>[27]</sup> Patients have placed high levels of trust in health care professionals and it is also important at an institutional level.<sup>[28]</sup> Vulnerable patients always relies on competent healthcare professionals which can increase the greater willingness to seek care and follow instructions which allow attaining the therapeutic goal and better healthcare system.

## ROLE OF PHARMACIST IN PREVENTING MEDICATION ERROR

The WHO reports states “Effective medicine can be practiced only where there is efficient drugmanagement”. Only when the pharmacist has been accepted as a vital member of the healthcare team can the necessary supporting services be organized with the professionalism that they demand”.<sup>[29]</sup>

Clinical pharmacist play vital role in prevention and identification of medication error. Several studies proved that clinical pharmacists' interventions can effectively prevent these errors. The types of errors indicate the need for continuous education and implementation of clinical pharmacist's interventions. (Khalili H et al).<sup>[30]</sup>

A pharmacist should develop methods to detect errors and ADEs in the hospitals and clinics. Improving medication use safety should be the motive of the pharmacist profession and a

pharmacist should also give attention to patients who had experienced medication error and try to focus on managing and improving the system so the errors hardly occur.<sup>[31]</sup> The pharmacist should accept the social mandate to ensure the safe and effective drug therapy of an individual patient, only then the pharmacist reprofessionalization will be completed. The social responsibility should be accepted by the pharmacist to nurture and mature to prevent the drug related morbidity and mortality.<sup>[32]</sup>

## DISCUSSION

Medication errors are the most common type of medical error. Errors can happen any phases of medication handling, storage, prescribing, transcription, preparation and dispensing, or administration and monitoring of medications. Each of these nodes of the medication system, with its many components, is prone to failure, resulting in harm to patients. Any of this system is prone to errors, at any stage which ultimately leads to treatment failure or illeffects to patients.<sup>[33]</sup> Providing understanding of how information technology, labeling, medication reconciliation, and improved care transitions reduce medication errors is needed. A focus on easy-to-use and inexpensive techniques for medication error reduction will likely have the greatest impact.<sup>[34]</sup> By developing a suitable and transparent strategy of medication safety culture can reduce the statistics of medication errors. For promoting medication safety, system level mechanisms are used to translate into better outcomes, but may be independently ineffective in the face of poor safety culture.<sup>[35]</sup> Medication errors can only be prevented and reduced by focusing on the system as a whole, not on the individual clinician or nurse.<sup>[36]</sup>

## CONCLUSION

Theoretically, all medication errors are preventable. A multidisciplinary method to resolve the problem of medication errors are mandatory which implements no blame. Reporting medical errors should be encouraged in all sectors of medication handling.

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## CONFLICT OF INTEREST

We declare that we have no conflict of interest.

**REFERENCES**

1. WHO. 2000. The World Health Report 2000 – Health Systems: Improving Performance. Geneva.
2. Burns, L.R. India's Healthcare Industry: A System Perspective. In Burns, L.R. (Ed.), India's Healthcare Industry: Innovation in Delivery, Financing, and Manufacturing, 2014; 3-37. Cambridge University Press.
3. Eisa-Zaei A, Hiremath SRR and Prasad S: Comprehensive evaluation of medication errors incidence at a Tertiary Care Hospital. *Int J Pharm & Sci Res*, 2018; 9(12): 5315-19.
4. Ravi Duggal: Bhore Committee (1946) and its Relevance Today *Indian J Pediatr* 1991; 58: 395-406.
5. Bruke B. Billoro<sup>1</sup>, Million L. Lorato: Prescribing error and associated factors at the pediatric ward of Wachemo University Nigist Eleni Mohammed Memorial Hospital, Southern Ethiopia ; *The Journal of Medical Research*, 2018; 4(5): 227-23.
6. Isha Patel: Medication error management around the globe: An overview *Indian J Pharm Sci*, 2010; 72(5): 539-545.
7. Chandra Deve Varma BSK, Balaji Bhusan Patnaik, Ratakonda Sruthi, Gangavaram sravan kumar Reddy, V.Venkatesh, Jogi Satyasree. Incidence of various medication errors in pediatrics in a tertiary care hospital. *Int J Pediatr Res*, 2018; 5(9): 441-445.
8. MADHAW DWIVED, AMIT SHARMA, SANDEEP ARORA; A Review on Medication Errors *Journal of Pharmaceutical Technology, Research and Management*, November 2015; 3(2): 89–96.
9. Dalmolin, Gabriella Rejane dos Santos, Rotta, Eloni Terezinha, & Goldim, José Roberto. Medication errors: classification of seriousness, type, and of medications involved in the reports from a university teaching hospital. *Brazilian Journal of Pharmaceutical Sciences*, 2013; 49(4): 793-802.
10. Medication Errors: Technical Series on Safer Primary Care. Geneva: World Health Organization, 2016.
11. Rehan HS, Bhargava S. Medication Errors Are Preventable. *J Pharmacovigilance*, 2015; S2: 005.
12. Franklin, B.D., Vincent, C., Schachter, M. et al. The Incidence of Prescribing Errors in Hospital Inpatients. *Drug-Safety*, 2005; 28: 891-900.
13. Shrestha R, Prajapati S. Assessment of prescription pattern and prescription error in outpatient Department at Tertiary Care District Hospital, Central Nepal. *J Pharm Policy Pract*, 2019; 12: 16.



14. Kistner UA, Keith MR, Sergeant KA et al. Accuracy of dispensing in a high volume, hospital-based outpatient pharmacy. *Am J Hosp Pharm*, 1994; 51: 2793-7.
15. Baraki Z, Abay M, Tsegay L, Gerense H, Kebede A, Teklay H. Medication administration error and contributing factors among pediatric inpatient in public hospitals of Tigray, northern Ethiopia. *BMC Pediatr*, 2018; 18(1): 321.
16. Vijay Roy, Paneet Gupta, Shouryadeep Srivastava \* MEDICATION ERRORS: CAUSES & PREVENTION ;Health Administrator, Vol : XIX Number 1: 60-64.
17. Guideline on medication error reporting system (MERS), July 2019.
18. Elden NM, Ismail A. The Importance of Medication Errors Reporting in Improving the Quality of Clinical Care Services. *Glob J Health Sci*, 2016; 8(8): 54510.
19. Linden-Lahti C, Holmström AR, Pennanen P, Airaksinen M. Facilitators and barriers in implementing medication safety practices across hospitals within 11 European Union countries. *Pharm Pract (Granada)*, 2019; 17(4): 1583.
20. Jember, A., Hailu, M., Messele, A. et al. Proportion of medication error reporting and associated factors among nurses: a cross sectional study. *BMC Nurs*, 2018; 17: 9.
21. Dilnasheen Sheikh Uday Venkat Mateti Shamaprasadh Kabekkodu T. Sanal Assessment of medication errors and adherence to WHO prescription writing guidelines in a tertiary care hospital D. S / *Future Journal of Pharmaceutical Sciences*, 2017; 3: 60-64.
22. Mrayyan MT, Shishani K, Al-Faouri I. Rate, causes and reporting of medication errors in Jordan: nurses' Perspectives. *J Nurs Manag*, 2007; 15(6): 659–70.
23. Patel N, Desai M, Shah S, Patel P, Gandhi A. A study of medication errors in a tertiary care hospital. *Perspect Clin Res*, 2016; 7(4): 168–173.
24. Ridley SA, Booth SA, Thompson CM, The Intensive Care Society's working group on Adverse Incidents. Prescription errors in UK critical care units. *Anaesthesia*, 2004; 59: 1193–200.
25. Jai Krishna, Singh A K, Goel S, A.Gupta, Panesar S, Surana A, Chokker VK :A preliminary study on profile and pattern of medication errors from a tertiary care teaching hospital IAIM, 2015; 2(7): 93-98.
26. Binu Mathew, Rajendra singh Airee, Jibily Joy, Cherukuri Sri Sindhu, Rajput Nayan Raj Priya, Sarfraz M. D; Study and evaluation of medication errors in a tertiary care hospital; *Asian journal of pharmaceutical health sciences*, oct 2015(5).
27. Tariq RA, Scherbak Y. Medication Errors. [Updated 2020 Feb 18]. In: StatPearls [Internet]. Treasure Island (FL): Stat Pearls Publishing, 2020 Jan.

28. Rosemary Rowe, Michael Calnan, Trust relations in health care—the new agenda, *European Journal of Public Health*, February 2006; 16(1): 4–6.
29. WHO. 2000. The World Health Report; Role of pharmacist in healthcare system, 1994.
30. Khalili H(1), Farsaei S, Rezaee H, Dashti-Khavidaki S; Role of clinical pharmacists' interventions in detection and prevention of medication errors in a medical ward.; *Int J Clin Pharm*, 2011 Apr; 33(2): 281-4.
31. G.Parthasarathi, Karin Nyfort-Hansen, Milap C. Nahata. A Text Book of Clinical Pharmacy Practice: Essential Concepts and Skills; 2nd edition. Orient Blackswan, 2004; 486-505.
32. Hepler CD, Strand LM. Opportunities and responsibilities in pharmaceutical care. *Am J Hosp Pharm*, 1990 Mar; 47(3): 5.
33. Kriti Malhotra, Manoj Goyal, Rani Walia, Shafiqua Aslam; Medication Errors: A Preventable Problem, *Indian Journal of Clinical Practice*, June 2012; 23(1).
34. Medication errors: an overview for clinicians; *Mayo Clin Proc*, 2014; 89(8): 1116-1125.
35. Abstoss KM, Shaw BE, Owens TA, et al Increasing medication error reporting rates while reducing harm through simultaneous cultural and system-level interventions in an intensive care unit *BMJ Quality & Safety*, 2011; 20: 914-922.
36. Allard, J., Carthey, J., Cope, J., Pitt, M. and Woodward, S. MEDICATION ERRORS: CAUSES, PREVENTION AND REDUCTION. *British Journal of Haematology*, 2002; 116: 255-265.