

A Review on Medication Errors

MADHAW DWIVEDI^{1,*}, AMIT SHARMA², SANDEEP ARORA³

¹Department of Pharmacy Practice, ³Chitkara College of Pharmacy, Chitkara University Punjab, India

²Department of Pharmacy Practice, I.S.F. College of Pharmacy, Moga, Punjab, India

*Email: madhawdwivedi999@gmail.com

Received: July 12, 2015| Revised: September 17, 2015| Accepted: October 20, 2015

Published online: November 17, 2015

The Author(s) 2015. This article is published with open access at www.chitkara.edu.in/publications

Abstract: Role of clinical pharmacist is to provide optimal pharmaceutical care for individual patients and optimal pharmaceutical care is attained when the right drug in the correct dosage and quality reaches the right patients at the right point in time with the right information. Any preventable event that may cause or lead to inappropriate medication use or patient harm during medication to user is called medicational error and is in the control of the health care professional, patient and consumer. In this review on medication errors, prescribing errors (67 %), administration errors (25%), dispensing errors (08%) were found on the basis of review of literature. Prescribing errors are the prime cause of MEs that further leads to subsequent dispensing and administration errors. Medication errors are common cause of adverse drug events or subtherapeutic outcomes of pharmaceutical care.

Keywords: Literature Review, Medication Errors, Prescribing Errors, Omission Errors, Wrong Time Errors, Unauthorized Drug Errors, Improper Dose Error, Wrong Dosage Form Errors, Wrong Drug Preparation Errors

1. INTRODUCTION

Role of clinical pharmacist is to provide optimal pharmaceutical care for individual patients and optimal pharmaceutical care is attained when the right drug in the correct dosage and quality reaches the right patients at the right point in time with the right information (Maria *et al.*, 2005). Any preventable event that may cause or lead to inappropriate medication use or patient harm during medication to patient, is called medication error, and is in the control of the health care professional, patient and consumer (Pote

Journal of Pharmaceutical
Technology, Research and
Management
Vol-3, No-2
November 2015
pp. 89-96

Dwivedi, M
Sharma, A
Arora, S

et al., 2007). Medication errors are common cause of subtherapeutic outcomes of pharmaceutical care. Medication errors may occur during hospitalization, and may lead to unnecessary cost; unnecessary diagnostic evaluations, unnecessary treatments, and deaths (Haftay *et al.*, 2015). Medication errors may occur at any stage of medication use system including storage, prescription, transcription, preparation, dispensation, and administration of drugs but errors are most common during prescribing & administration (Aronsen *et al.*, 2009).

An expert panel of the Institute of Medicine estimated that 44,000 to 98,000 people in the United States die each year as a result of medical errors, making medical error the 6-9 top cause of mortality (Medicine Io., 2009). A study was carried out by Harvard Medical Practice. In this study, it was shown that 3.7% of patients admitted to hospitals in the state of New York experienced injury resulting from medical care. It was also shown that 19 % of these injuries were caused by the use of medicines (Schneider *et al.*, 2014). According to American Society of Health-System Pharmacist' (ASHP) definition of medication errors includes prescribing, dispensing, medication administration and patient compliance errors. They define the following categories of medication errors:

Prescribing errors, Omission errors, Wrong time errors, Unauthorized drug errors, Improper dose error, Wrong dosage form errors, Wrong drug preparation errors, Wrong administration or technique errors, Deteriorated drug errors, Monitoring errors, Compliance errors. Errors arise when an action is intended but not performed; errors that arise from poor planning or inadequate knowledge are characterized as mistakes; those that arise from imperfect execution of well-formulated plans are called slips when an erroneous act is committed and lapses when a correct act is omitted (Majid *et al.*, 2012).

2. METHODS

2.1 Search strategy

Authors independently selected and one of them reviewed the articles by following these stages: Inclusion and exclusion criteria were assessed both in reading the titles and abstracts of the search results. The data extraction tables comprised these sections which were examined in each article: sources, underreporting of, preventive measures for and drugs involved in MEs; unit of observation studied; sample size; study design and/or measurement tool(s); reported outcome(s); and main finding(s). Then all full-texts of the selected articles were collected and the exclusion criteria were also applied to the full-texts. A review of literature relating to MEs in prescribing, dispensing, and administration in patients was done. Different Medication related studies were reviewed and analyzed.

2.2. Search terms

Different terms and were used as search terms: medication error, prescribing error, dispensing error, administration error etc.

2.3 Review procedure

Different previous studies were reviewed for various types of medication errors and number of medication error are taken as (n). After that different types of MEs were calculated by using this total (n).

3. RESULTS

Total ten different studies were reviewed and total 2744 different MEs are identified. Out of total MEs, 1826(66%) prescribing errors, 232(09%) dispensing error, and 686(25%) administration errors were found (Pote *et al.*, 2007; Majid *et al.*, 2012 ; Karna *et al.*, 2012 ; Sapkota *et al.*, 2011 ; Anitha *et al.*,2015 ; Ganeshan *et al.*, 2015 ; Abdulla *et al.*, 2004 ; Krishna *et al.*, 2015 ; Shrestha *et al.*, 2015 ; Gaur *et al.*, 2012). Various types of errors are shown in figure 1

Out of various types of MEs, (n=1826) Prescribing errors are occurred and they further categorized and shown in table 1 with mean 140.4615. Instructions for start/end time and duration for drug use in prescriptions are generally missing in prescriptions. This type of PEs are found maximum 338(%) in this study. Wrong dose and wrong route are also missing in various prescriptions. In this study 220 (%) wrong doses and 320 (%) wrong routes PEs are found. Wrong drug and order illegibility are also common PEs in all prescriptions. In this study 45 (%) wrong drug/order illegible PEs are found while 50 (%) wrong frequency PEs is found.

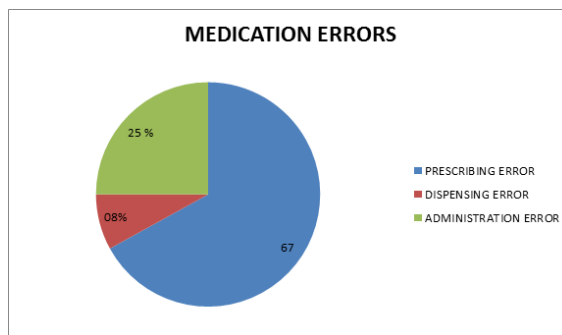


Figure 1: Various types of medication errors.

Dwivedi, M
Sharma, A
Arora, S

Table 1: Various Prescribing Errors (PEs).

S.N.	Types of prescribing error	Number of error n=1826	Percentage %
1	Order illegible/wrong drug	46	2.52
2	Directions not stated	30	1.64
3	Order written on wrong chart	4	0.22
4	Wrong dose	220	12.05
5	Wrong Route	320	17.53
6	Wrong Frequency	50	2.74
7	Start/End time duration not mention	338	18.51
8	Fails to complete order	4	0.22
9	Wrong order entry in computer pharmacy	5	0.27
10	Enter wrong order in MAR*	10	0.55
11	Wrong computer order entry	31	1.7
12	Fails to discontinue medication when ordered	8	0.42
13	Errors not otherwise classifiable	760	41.63
	Total	1826	100

*Medication administration record

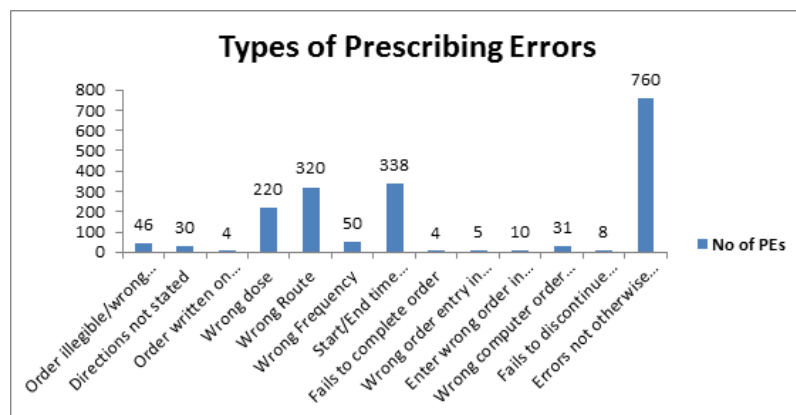


Figure 2: Various Prescribing Errors.

Table 2: Various Dispensing errors.

S.N.	Types of dispensing errors	No Dis. Error (N=232)	Percentage (%)
(B) Nursing Dispensing error			
A1	Dispensing wrong medication	32	13.79
A2	Dispensing incorrect dose	20	8.62
(B) Pharmacy Dispensing Error			
B1	Improper dose	09	3.87
B2	Dispensing wrong medication	04	1.72
B3	Dispensing incompatible drug	03	1.29
B4	Fail to supply medication at right time	11	4.74
B5	Abbreviated Non Standard drug name	145	62.5
B6	Error prone abbreviations, symbols and dose designations	08	3.44

Dispensing of drugs involve supply of correct drug, correct dose to right patient at right time by pharmacist and simultaneously correct drug in right dose should dispense by nurse. Dispensing errors are frequently occurring in hospitals by pharmacists and nurses. Total 232 (08 %) dispensing errors are found in this study with mean 29. Various types of dispensing errors are shown in table 2. Dispensing of improper dose 09 (3.87%), wrong medications

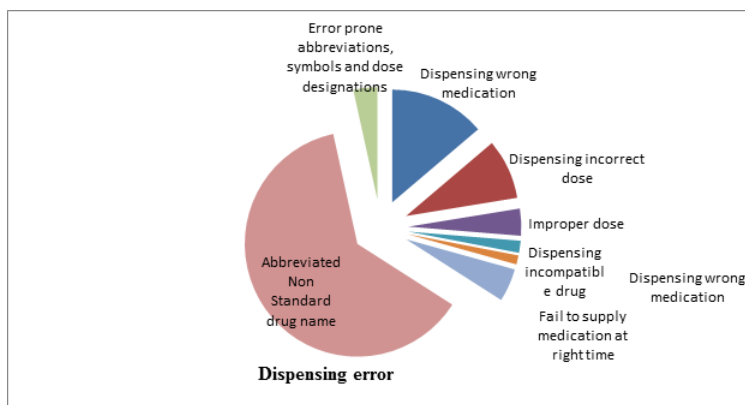


Figure 3: Various Dispensing Errors.

Dwivedi, M
Sharma, A
Arora, S

Table 3: Various Administration errors.

S.N.	Types of Administration Error	No. of administration Error (N=686)	Percentage %
1	Omission Error	108	15.74
2	Wrong Patient	02	0.29
3	Wrong time	76	11.07
4	Wrong Dose	59	08.60
5	Wrong route	24	3.49
6	Administer after discontinue order	34	4.95
7	Wrong Medication given	23	3.35
8	Failure to Chart Medication	06	0.87
9	Allergy	02	0.29
10	Monitoring	04	0.58
11	Patients particulars	283	41.25
12	Drug Availability	65	9.47
	Total	686	

04 (1.72%) are done by pharmacist while dispensing wrong medication 32(13.79%) and 09 (3.87 %) cases of dispensing wrong dose by nursing staff. Another maximum 145(62%) abbreviated non standard drug name type of dispensing error are found.

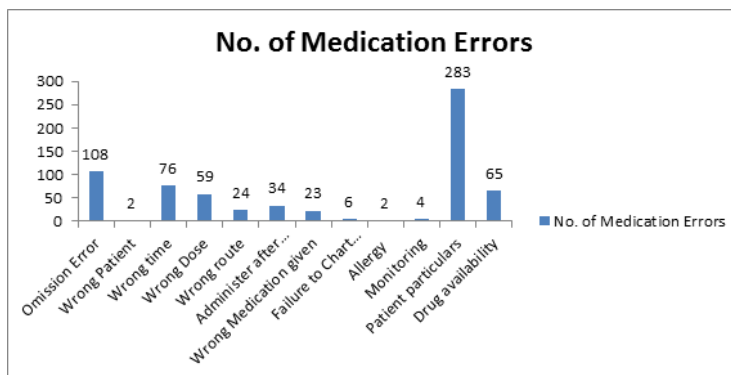


Figure 4: Various Administration errors.

Administration of drugs in patients is very critical stage in drug use process because it is directly related to adverse drug events or subtherapeutic outcome of drugs in patients. Total 686 Administration Errors (AE) found. Maximum 108 (15.74%) omission errors are found. Administration of wrong medication 23 (3.48%) AEs are found. Similarly wrong patient, wrong route, wrong dose and wrong time are 02(0.29%), 24(3.49%), 59(8.60%) and 76(11.07%) are found. Administration Errors also occurred when patient particulars are incorrect and availability of drugs are insufficient or improper. In this study incorrect patient particulars 283 (41.25%) are found while improper drug availability are 348 (50.73 %).

CONCLUSIONS

Errors and faults in prescribing are in most cases preventable. Intervention strategies should be primarily focused on education and the creation of a safe and cooperative working environment, to strengthen defence systems and minimize harm to the patient. Systems-oriented interventions increase awareness of risk among healthcare personnel. Interventions aimed at improving knowledge and training, and reducing complexity and the introduction of strict feedback control and monitoring systems are highly advisable. However, large-scale information on the beneficial effects of interventions aimed at reducing harm from prescribing faults and prescription errors is not yet available and is needed.

According to current scenario of hospital setting in developing countries, medication errors have been increasing day by day due to increasing number of patients and medicines that leads to medication errors. Medication errors can lead mild to severe adverse drug events hence global awareness is required for prevention of Medication errors.

In future, role of clinical pharmacist will be valuable for preventing MEs. Several studies proved that vigilant monitoring by clinical pharmacist in hospital setting minimise the chance of medication errors (Majid, *et al.*, 2012). Hence proper auditing of prescriptions and vigilant monitoring of administering drugs to patients by clinical pharmacist will minimise and make error free drug use system possible in patients.

REFERENCES

- [1] Abdulla, D. C., Ibrahim, N. S., Ibrahim, M. I. M. (2004). Medication errors among geriatrics at the outpatient pharmacy in a teaching hospital in Kelantan. *Malaysian Journal of Medical Sciences*, **11**(2), 52-58.
- [2] Anitha, N., Begum, S., & Reddy, S. (2015). Quantitative and qualitative analysis of medication errors: The Indian urban experience. *European Journal of Pharmaceutical and Medical Research*, **2**(5), 745-761.

Dwivedi, M
Sharma, A
Arora, S

- [3] Aronsen, J. K.,(2009) Medication errors: what they are, how they happen,and how to avoid them. *Q J Med*, **9(102)**, 513–21. <http://dx.doi.org/10.1093/qjmed/hcp052>
 - [4] Ganeshan, S., Boguda, V. A., Alex, A. B., &Anusha, B. (2015). A prospective study on medication errors in a general hospital. *Der Pharmacia Lettre*, **7(4)**, 47-50.
 - [5] Gaur, S., Sinha, A. K., Srivastava, B. (2012). Medication errors in medicine wards in a tertiary care teaching hospital of a hill state in India. *Asian Journal of Pharmacy and Life Science*, **2(1)**, 56-63.
 - [6] Haftay, B., Geberehiwot, K., &Minyahil, A. (2015). Prevalance of Medication Prescribing Errors in the Elderly. *International Journal of Pharma Sciences*, **5(2)**, 981-985.
 - [7] Karna, K., Sharma, S., Inamdar, S., &Bhandari, A. (2012). Study and evaluation of medication errors in a tertiary care teaching hospital- A baseline study. *International Journal of Pharmacy and Pharmaceutical Sciences*, **4(5)**, 587-593.
 - [8] Krishna, J., Singh, A. K., Goel, S., Singh, A., Gupta, A., Panesar, S., *et al.* (2015). A preliminary study on profile and pattern of medication errors from a tertiary care teaching hospital. *International Archives of Integrated Medicine*, **2(7)**, 93-98.
 - [9] Majid, A K., *et al.*, (2012). The roles of clinical pharmacy in reducing medication errors. *Asian Journal of Pharmaceutical and Clinical Research*, **3(9)**, 76-83.
 - [10] Maria, A.,Krähenbühl-Melcher, S.M. (2005). Hospital Drug Safety – Role of the Pharmacists. http://edoc.unibas.ch/diss/DissB_7153. Accessed 21 december 2015.
 - [11] Medicine Io. (1999).To err is human: building a safer health system. <http://iom.edu/1999>. Accessed 23 December 2015.
 - [12] Pote,S., Tiwari, P.,D’cruz, S., (2007). Medication prescribing errors in a public, teaching hospital in India: A prospective study *Pharmacy Practice*, **5(1)**, 17-20. <http://dx.doi.org/10.4321/S1886-36552007000100003>
 - [13] Sapkota, S., Pudasaini, N., Singh, C., Sagar, G.C. (2011). Drug prescribing pattern and prescription error in elderly: A retrospective study of inpatient record. *Asian Journal of Pharmaceutical and Clinical Research*, **4(3)**, 129-132.
 - [14] Schneider, J. P. (2014). Medication errors and adverse drug events. In Parthasarathi, G., &Milap, C. N. (Ed. 2), *A textbook of Clinical Pharmacy Practice* (pp.486-505). Hyderabad: India.
 - [15] Shrestha, S., &Ramanath, K. V. (2015). Study and Evaluation of Medicine and Orthopedic Wards of a Tertiary Care Hospital. *British Journal of Pharmaceutical Research*, **7(3)**, 183-195. <http://dx.doi.org/10.9734/BJPR/2015/18736>
-