



Medication Errors and Pharmacist Intervention at Government Hospital of Hyderabad, Pakistan

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Authors' contributions

This work was carried out in collaboration among all authors. Author RS designed the study, managed the literature searches, wrote the protocol and wrote the first draft of the manuscript. Author AD managed the analyses of the study and write up checking. Author MAG performed the data collection and statistical analysis along with write up checking. All authors read and approved the final manuscript.

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ABSTRACT

Background: Medication errors are of primary concern in hospitals of Pakistan but only few are reported. Prevalence and type of medication errors are essential for estimating the appropriateness of therapy. Pharmacist is key in improving therapy effectiveness and decreasing medication errors.

Objective: To assess the prevalence, type of medication errors and pharmacist interventions.

Methodology: An interventional study on prescriptions of inpatients was conducted at Liaquat University of Medical and Health Sciences (LUMHS) Hyderabad. Five hundred and fifteen prescriptions were collected randomly from medicine, gynecology and obstetrics and urology department during one year from 01-09-2017 to 31-08-2018. Medications errors were identified by Pharmacist by comparing the prescriptions with standard of British National Formulary (BNF) (edition 73) and informing physician for resolving medication errors. Data was analyzed with statistical package for social sciences version 25.0.

Results: Out of 515 inpatients prescriptions, male patients were 248 (48.2%) and female were 267 (51.8%) with male to female ratio of 1:1.08 and mean age of 37.7 ± 11.6 (18-60) years. 427 medication errors were reported in 303 (59.4%) prescriptions including; omission error 64 (15.0%),

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unauthorized drug error 41 (9.6%), wrong dose error 67 (15.7%), wrong time error 74 (17.3%), wrong dosage form error 27 (6.3%), wrong route error 23 (5.4%), wrong drug preparation 44 (10.3%), wrong rate error 56 (13.1%) and incorrect administration technique 31 (7.3%). 172 (40.3%) interventions of pharmacists were accepted by physicians.

Conclusion: Rate of medication errors in inpatients prescriptions are high with possible errors of dose, time, omission, rate, drug preparation and others. Pharmacist effectively intervening the prescriptions and playing active role in decreasing medication errors.

Keywords: Medication errors; prescriptions; pharmacist; interventions; inpatients.

1. INTRODUCTION

Appropriate and safe use of medication is blessing for patients suffering from different sort of diseases. Increasing use of medication also increased the risk of medication errors (MEs) due to their complex nature and impact on health of patient. Despite the efforts of health care workers with implementation of different electronic systems used for prescribing medication, MEs are reported from every corner of world, resulting in compromised safety of patient [1,2]. 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" [3].

Medications errors are considered as serious problem of health and mortality throughout the world. Approximately 0.1 million deaths per years throughout the world are reported due to medication errors [3]. In developing countries like United States, approximately seven to nine thousand deaths are reported due to MEs, whereas thousands of patients failed to report, and thousands suffers from different complications and need medications. MEs are not only increasing the morbidity, mortality, cost of treatment but also shake the patient trust over healthcare system and decrease the level of patient satisfaction [4,5].

In hospital admitted patients, treatment is provided with proper coordination of physicians and paramedical staff that also increased the risk of medication errors at different levels, so monitoring is required at different levels [6]. Different approaches are used to distribute the medication errors such as process of medication use errors, knowledge based errors, rule based errors, slip errors and lapses errors. World Health organization also classify the MEs into patient error, drug error, dose error, frequency error, duration error and administration route error. Medication errors can also be observed during the process of medication including (1)

prescribing, (2) transcribing and verifying, (3) dispensing and delivering, (4) administering and (5) monitoring and reporting [7,8].

Patient safety should begin as the patients admitted in hospital because identification of medication errors is challenge for health care workers. It is very important to discover the consistent reason behind MEs followed by finding consistent solution to decrease the risk of recurrent MEs. Inpatient safety can be enhanced by timely identification of MEs, learning from them and then designing methods to subside them. Coordination of patient and health care workers also play key role in decreasing MEs [9,10].

In Pakistan, health care system is in very poor state and lacking basic health care facilities. Government and even private hospitals are lacking the facilities and health care workers especially pharmacists are working in very few numbers throughout the country. Pharmacist is key in improving therapy effectiveness by identifying and reporting medication errors as well as providing solution to physician for avoiding medication error. The current study was designed in tertiary care hospital of Sindh, Pakistan for identification of prevalence of medication errors and types of medication errors in inpatients prescriptions as well as effectiveness of pharmacist in preventing reported medication errors.

2. METHODOLOGY

An interventional study on in-patients suffering from different common diseases was conducted at Liaquat University of Medical and Health Sciences (LUMHS) Hyderabad. Prescriptions were randomly collected from three department including medicine, gynecology and obstetrics and urology department. Five hundred and fifteen prescriptions were collected during study period of one year from 01-09-2017 to 31-08-2018.

Inpatients prescriptions were collected from patients of; (1) either gender, (2) age 18-60 years and (3) willing to enrolled in study. Inpatients prescriptions of; (1) children, (2) elders, (3) patients with less than twenty four hours stay in hospital, (4) suffering from serious infections and (5) not ready to consent were not collected.

Special standard forms for data collection and analysis were designed and used for collection of data that contain the information about demographic and medical details of patient, identified medication errors, intervention by pharmacist and acceptance or rejection by physician. Pharmacist working in hospital wards play active role in collection and evaluation of prescription and filling the forms. Medications errors were identified by Pharmacist by comparing the prescriptions with standard of British National Formulary (BNF) (edition 73) and informing physician about medication errors and solution for resolving medication errors. A standard protocol for study was developed and followed for each prescription shown in Fig. 1. Data was analyzed with statistical package for social sciences version 25.0.

3. RESULTS

A total of 515 inpatients prescriptions were evaluated for medication errors, among which male patients were 248 (48.2%) and female were 267 (51.8%) Fig. 2 with male to female ratio of 1:1.08.

Average age of selected inpatients was 37.7 ± 11.6 years with range of 18-60 years. Most of the patients were in age group of 18-30 years with

154 (29.9%) patients followed by 31-40 years with 153 (29.7%) patients, 41-50 years with 121 (23.5%) patients and 51-60 years with 87(16.9%) patients Table 1.

Out of 515 prescriptions, 427 medication errors were reported in 303 (59.4%) prescriptions Fig. 3 with ratio of 1.41 medication error per prescription. Commonly identified medication error in inpatients prescriptions were; omission error in 64 (15.0%) prescriptions, unauthorized drug error in 41 (9.6%) prescriptions, wrong dose error in 67 (15.7%) prescriptions, wrong time error in 74 (17.3%) prescriptions, wrong dosage form error in 27 (6.3%) prescriptions, wrong route error in 23 (5.4%) prescriptions, wrong drug preparation in 44 (10.3%) prescriptions, wrong rate error in 56 (13.1%) prescriptions and incorrect administration technique in 31 (7.3%) prescriptions Table 2.

Pharmacists are efficiently working in hospital and intervene in 427 medication errors, as a result 172 (40.3%) interventions were accepted by physicians and 255 (59.7%) interventions were not accepted by physicians. Accepted and not accepted interventions of pharmacist by physicians were; omission error 29 (6.8%) vs 35 (8.2%), unauthorized drug error 17 (4.0%) vs 24 (5.6%), wrong dose error 25 (5.9%) vs 42 (9.8%), wrong time error 32 (7.5%) vs 42 (9.8%), wrong dosage form error 13 (3.0%) vs 14 (3.3%), wrong route error 9 (2.1%) vs 14 (3.3%), wrong drug preparation 19 (4.5%) vs 25 (5.9%), wrong rate error 15 (3.5%) vs 41 (9.6%) and incorrect administration technique 13 (3.0%) vs 18 (4.4%) respectively Table 3.

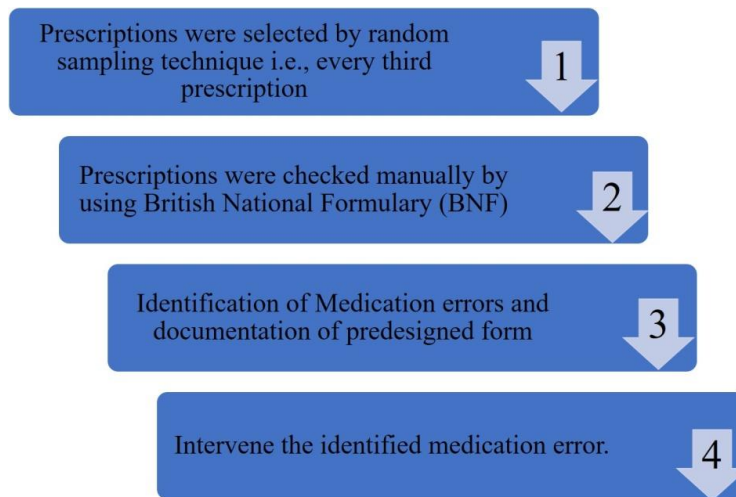


Fig. 1. Protocol designed for study prescription collection and evaluation

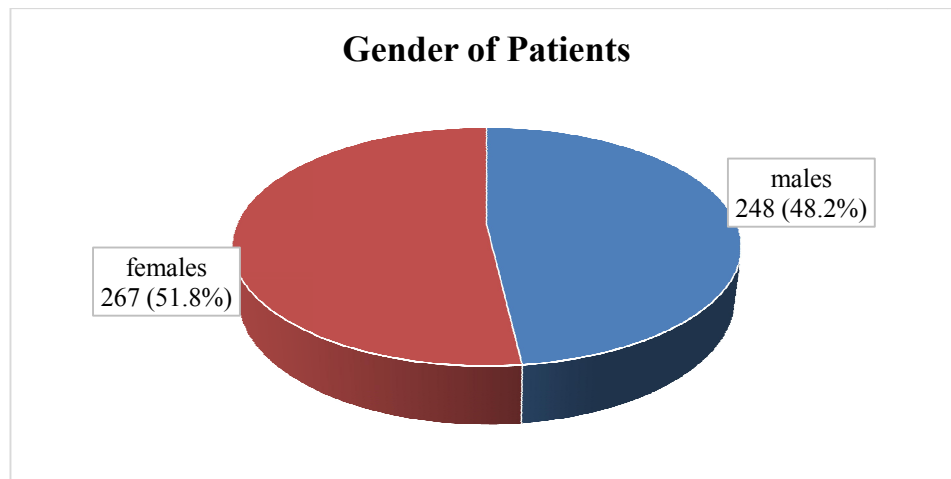


Fig. 2. Gender of patients

Table 1. Age of inpatients

Age	Frequency	Percentage
Mean ± SD	37.7 ± 11.6 (18-60)	
18-30	154	29.9
31-40	153	29.7
41-50	121	23.5
51-60	87	16.9
Total	515	100.0

Table 2. Medication errors in prescriptions

S. No	Medication Errors	Frequency	Percentage
1	Omission error	64	15.0
2	Unauthorized drug error	41	9.6
3	Wrong dose error	67	15.7
4	Wrong time error	74	17.3
5	Wrong dosage form error	27	6.3
6	Wrong route error	23	5.4
7	Wrong drug preparation	44	10.3
8	Wrong rate error	56	13.1
9	Incorrect administration technique	31	7.3
10	Total	427	100.0

Table 3. Intervention in medication errors

S. No	Medication errors	Interventions	
		Accepted	Not accepted
1	Omission error	29 (6.8%)	35 (8.2%)
2	Unauthorized drug error	17 (4.0%)	24 (5.6%)
3	Wrong dose error	25 (5.9%)	42 (9.8%)
4	Wrong time error	32 (7.5%)	42 (9.8%)
5	Wrong dosage form error	13 (3.0%)	14 (3.3%)
6	Wrong route error	9 (2.1%)	14 (3.3%)
7	Wrong drug preparation	19 (4.5%)	25 (5.9%)
8	Wrong rate error	15 (3.5%)	41 (9.6%)
9	Incorrect administration technique	13 (3.0%)	18 (4.4%)
10	Total	172 (40.3)	255 (59.7%)

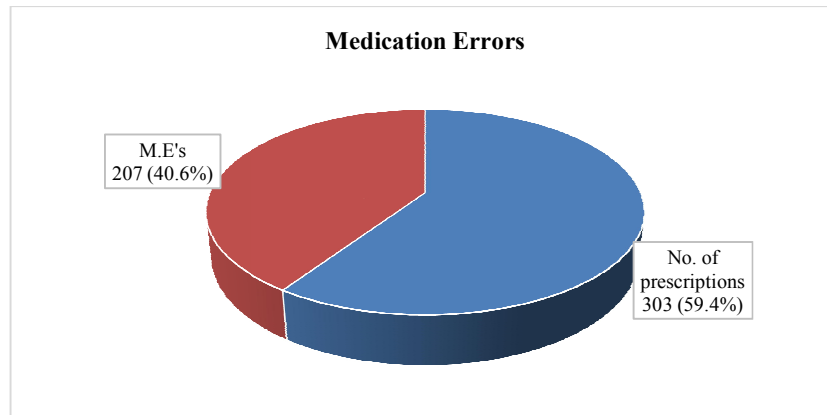


Fig. 3. Medication errors in prescriptions

4. DISCUSSION

Medication errors are capable for compromising the patient safety and developing serious complication that further needs appropriate management. MEs are also capable to worsen the patient overall health and complications results in increased morbidity, hospital stay, mortality and economic burden on patient and health care system [11,12].

In Pakistan rate of medication errors is very high due to lack of health care workers, facilities and use of developed systems including mandatory or voluntary reporting systems for avoiding medication errors [10]. In current study, 427 medication errors were reported in 303 (59.4%) prescriptions, whereas other Pakistani studies are also reporting high medication errors ranging from 40-68% [13,14]. High medication errors are reported in Pakistani hospitals due to burden of patient on hospital, lack of health care professionals including pharmacist, and unavailability of medication error reporting systems.

In this study commonly reported MEs were; omission error 64 (15.0%), unauthorized drug error 41 (9.6%), wrong dose error 67 (15.7%), wrong time error 74 (17.3%), wrong dosage form error 27 (6.3%), wrong route error 23 (5.4%), wrong drug preparation 44 (10.3%), wrong rate error 56 (13.1%) and incorrect administration technique 31 (7.3%). Similar results were also reported by other researchers such as; Berdot S et al. [15] reported the omission error in 14.0%, unauthorized drug error in 3.7%, wrong dosage form error 1.9%, wrong route error in 1.9%, wrong drug preparation in 1.9% and incorrect administration technique in 1.9% [16],

Barker, K. N., et al. [17] reported the omission error in 6.0%, wrong dose error in 3.0% and wrong dosage form error 1.0% [17], Haw. C., et al. reported the omission error in 27.1% and unauthorized drug error in 1.0% [18], Chua, S. S., et al. [19] reported the unauthorized drug error in 14.1%, wrong time error in 25.2%, wrong route error in 21.3% and incorrect administration technique in 16.3% [19], Tissot, E., et al. [20] reported the wrong dose error in 41.0%, wrong time error in 26.0% and wrong rate error in 19.0% [20] and Berdot, S., et al. [15] reported the wrong drug preparation in 8.6% and incorrect administration technique in 4.1% [15].

MEs are developed due to mistakes of different persons involving patients, physicians, nurses and pharmacist. Such as omission error because of failure to administer drug, unauthorized drug error because of wrong administration of drug, wrong dose error because of low or high dose administration, wrong time error because of early or late drug administration, wrong dosage form like drug in suspension form instead of tablet form, wrong route error like intramuscular drug administered from intravenous route, wrong drug preparation like mixing incompatible chemicals, wrong rate error because of fast or slow administering intravenous solution, incorrect administration technique like injecting subcutaneous injection in deep muscles, etc.

Pharmacists are efficiently working in hospital and intervene in 427 medication errors, as a result 172 (40.3%) interventions were accepted by physicians and 255 (59.7%) interventions were not accepted by physicians. Pakistan is a developing country, where concept of pharmacist is not common. Hospital's pharmacist are working in only few hospitals and few in number.

So, physicians are not well aware of role of pharmacist and refused to accept interventions. Hopefully, with time pharmacist will gain the confidence of physician and patients. Omission error interventions were 15.0% yet only 6.8% interventions were accepted by the prescribing physician with success rate of 45.3%. Unauthorized drug error were 9.6% yet only 4.0% interventions were accepted by the prescribing physician with success rate of 41.5%. Wrong dose error were 15.7% yet only 5.9% interventions were accepted by the prescribing physician with success rate of 37.3%. Wrong time error were 17.3% yet only 7.5% interventions were accepted by the prescribing physician with success rate of 43.2%. Wrong dosage form error were 6.3% yet only 3.0% interventions were accepted by the prescribing physician with success rate of 40.1%. Wrong route error were 5.4% yet only 2.1% interventions were accepted by the prescribing physician with success rate of 39.1%. Wrong drug preparation were 10.3% yet only 4.5% interventions were accepted by the prescribing physician with success rate of 43.2%. Wrong rate error were 13.1% yet only 3.5% interventions were accepted by the prescribing physician with success rate of 26.8%. Incorrect administration technique were 7.3% yet only 3.5% interventions were accepted by the prescribing physician with success rate of 41.9%. Overall success rate was 40.3%. Different studies reported the different impact of intervention such as Ali, J, et al. [21] 100.0%, Colpaert K., et al. [22] 23.6% and Ford, D. G., et al. [23] 24.6% [21-23]. Difference in our findings was reported due to poor health care facilities, lack of pharmacists in hospitals and lack of developed medication error reporting system in our setting. But it is important that all studies are showing the effective role of pharmacist in identification of MEs, reporting them to physician and advising suitable solution to avoid MEs.

Our study is limited to single center government hospital in which few hospital pharmacist are working. Prescriptions collection was restricted to medicine, gynecology and obstetrics and urology department.

5. CONCLUSION

Rate of medication errors in inpatients prescriptions are high with possible errors of dose, time, omission, rate, drug preparation unauthorized drug, administration technique,

dosage form and route. Pharmacist effectively intervening the prescriptions and playing active role in decreasing medication errors.

6. RECOMMENDATIONS

1. Effective training should be provided to pharmacists and nurses for identification and reporting of medication errors.
2. Implementation of computerized system for reporting medication errors will be further helpful to decrease the chances of missing medication errors.
3. Physicians should be properly guided about medication errors and their negative impact on health of patient so they should accept intervention of pharmacist.

CONSENT

It is not applicable.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Holmgren AJ, Co Z, Newmark L, Danforth M, Classen D, Bates D. Assessing the safety of electronic health records: A national longitudinal study of medication-related decision support. *BMJ Qual Saf.* 2020;29(1):52-9.
2. Mills PR, Weidmann AE, Stewart D. Hospital electronic prescribing system implementation impact on discharge information communication and prescribing errors: A before and after study. *Eur J Clin Pharmacol.* 2017;73(10):1279-86.
3. National Coordinating Council for Medication Error Reporting and Prevention. About medication errors: What is a medication error. *NCC MERP*; 2020.
4. Wittich CM, Burkle CM, Lanier WL. Medication errors: An overview for clinicians. *Mayo Clin Proc.* 2014;89(8): 1116-25.

5. Whittaker CF, Miklich MA, Patel RS, Fink JC. Medication safety principles and practice in CKD. *Clin J Am Soc Nephrol.* 2018;13(11):1738-46.
6. Riaz MK, Hashmi FK, Bukhari NI, Riaz M, Hussain K. Occurrence of medication errors and comparison of manual and computerized prescription systems in public sector hospitals in Lahore, Pakistan. *PLoS One.* 2014;9(8):106080.
7. Hughes RG, Blegen MA. Medication administration safety. In: Hughes RG, editor. *Patient safety and quality: An evidence-based Handbook for nurses.* Rockville (MD): Agency for Healthcare Research and Quality (US). 2008;37.
8. World Health Organization. *Medication errors: Technical series on safer primary care.* Switzerland, Geneva: WHO; 2016.
9. Azim M, Khan A, Khan TM, Kamran M. A cross-sectional study: Medication safety among cancer in-patients in tertiary care hospitals in KPK, Pakistan. *BMC Health Serv Res.* 2019;19(1):583.
10. Mauti G, Githae M. Medical error reporting among physicians and nurses in Uganda. *Afr Health Sci.* 2019;19(4):3107-17.
11. Zirpe KG, Seta B, Gholap S, Aurangabadi K, Gurav SK, Deshmukh AM, et al. Incidence of medication error in critical care unit of a tertiary care hospital: Where do we stand?. *Indian J Crit Care Med.* 2020;24(9):799-803.
12. Rodziewicz TL, Houseman B, Hipskind JE. Medical error prevention. [Updated 2020 Oct 17]. In: *Stat pearls* [Internet]. Treasure Island (FL): Stat Pearls Publishing; 2020.
13. Khayam MU. Medication errors assessment and prevention by a clinical pharmacist in pediatric wards of RMI hospital Peshawar, KPK-Pakistan. *Ann Pak Inst Med Sci.* 2015;11(3):124-9.
14. Mangi AA, Khan H, Joyo SA, Nindwani RA, Ahmer A, Mubshir SM. Evaluation and identification of medication errors in diabetic and general medicine department of Chandka medical college hospital Larkana. *Pak Armed Forces Med J.* 2018; 31;68(6):1771-4.
15. Berdot S, Gillaizeau F, Caruba T, Prognon P, Durieux P, Sabatier B. Drug administration errors in hospital inpatients: A systematic review. *PLoS One.* 2013;20;8(6):68856.
16. Berdot S, Sabatier B, Gillaizeau F, Caruba T, Prognon P, Durieux P. Evaluation of drug administration errors in a teaching hospital. *BMC Health Serv Res.* 2012;1:12(1):60.
17. Barker KN, Flynn EA, Pepper GA, Bates DW, Mikeal RL. Medication errors observed in 36 health care facilities. *Arch Intern Med.* 2002;9:162(16):1897-903.
18. Haw C, Stubbs J, Dickens G. An observational study of medication administration errors in old-age psychiatric inpatients. *Int J Qual Health Care.* 2007;19(4):210-6.
19. Chua SS, Tea MH, Rahman MH. An observational study of drug administration errors in a Malaysian hospital (study of drug administration errors). *J Clin Pharm Ther.* 2009;34(2): 215-23.
20. Tissot E, Cornette C, Limat S, Mourand JL, Becker M, Etievant JP, et al. Observational study of potential risk factors of medication administration errors. *Pharma World Sci.* 2003;25(6): 264-8.
21. Ali J, Barrow L, Vuylsteke A. The impact of computerised physician order entry on prescribing practices in a cardiothoracic intensive care unit. *Anaesthesia.* 2010;65(2):119-23.
22. Colpaert K, Claus B, Somers A, Vandewoude K, Robays H, Decruyenaere J. Impact of computerized physician order entry on medication prescription errors in the intensive care unit: A controlled cross-sectional trial. *Crit Care.* 2006;10(1): R21.
23. Ford DG, Seybert AL, Smithburger PL, Kobulinsky LR, Samosky JT, Kane-Gill SL. Impact of simulation-based learning on medication error rates in critically ill patients. *Intensive Care Med.* 2010; 36(9):1526-31.

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