Original Article

Magnitude of medication administration errors and their types

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Objective: To determine the magnitude of medication administration errors and their types among nurses working at tertiary care public sector hospital, Karachi, Pakistan.

Methodology: An analytical cross-sectional study was performed at Dr. Ruth K.M. Pfau Civil Hospital and Dow University Hospital, Karachi from January to October 2018. It included 204 nurses of both genders having one year working experience and registered with Pakistan Nursing Council. Non-probability purposive sampling method was used. The data were obtained by adopted and validated questionnaire and was analyzed using SPSS version 21.

Results: Out of 204 subjects, 106 (52%) were male and 168 (82.3%) had age below 35 years. The frequency of medication administration error was found in 167 (81.9%). Wrong time medication administration error was seen in 56 (27.5%) nurses, missed dose in (43.1%) and in 103 (50.5%) medications were administered with improper technique. Nurse who was assigned more than 15 patients committed [AOR = 1.59, 95% CI (0.65, 3.90)] more errors and those working in night shift committed [AOR = 2.32, 95% CI (0.82, 6.54)] more errors.

Conclusion: There was high frequency of medication administration errors among nurses working at our institution. The most prominent type of medication administration errors were technique error followed by missed drug.

Keywords: Medication administration error, types of error, wrong time medication.

INTRODUCTION

Medication administration error (MAE) has been identified as a grave health problem that can result in mortality and morbidity.[1] The main difference between what patients getting and what really recommended is called MAE. There are various types of MAE, which includes wrong medicine, wrong route, wrong dose, wrong patient, wrong time, wrong site, wrong dosage form, wrong infusion rate, wrong contraindication medicine and expired medicine.[2,3] MAE has high prevalence and such errors can be prevented.[4] Furthermore, the MAE may have dire consequences like it increases hospitalization which causes increase in economic burden, distress, disability and even threat to life may also occur.[5-8]

In hospitalized patients, per day one medication error occurs.[9] According to health agency of United Kingdom (UK) "National Patient Safety Agency" (NPSA), MAE occurs in 50% of all the cases in health care setting.[2] Wrong timing was secondary prevailed error which caused serious and fatal outcomes, as reported by NPSA.[2] Range of MAEs is reported from 9.4 – 80% by many nations like UK, USA, Middle East and East African countries[10] and figures are under reported worldwide particularly developing nations.[11]

A study from Karachi which reported 7.5% of missing doses and 17% administered at wrong time.[9] Another study from Karachi, highlighted 21% medication errors.[12] In Quetta, Pakistan one study reported missed dose error in 74.4%[13] and another has prevalence of MAE of 82.1%.[14] Therefore, this study aim was to identify the magnitude of MAE and its types among nurses working at tertiary care public sector hospitals Karachi, Pakistan.

METHODOLOGY

This analytical cross-sectional study was accomplished at Dr. Ruth K.M. Pfau Civil Hospital (CHK), and Dow University Hospital (DUH), Karachi from 1st January to 31st October 2018. It included 204 nurses of both genders having one year clinical working experience with being Pakistan Nursing Council (PNC) licensed-practitioners. Nurses having less than one year clinical working experience were excluded. Study was approved by Institutional Review Board (IRB) of Dow University of Health Sciences, and written informed consent was obtained from all the subjects.

Approach to subjects was made possible by non-probability purposive sampling method. Adapted and validated questionnaire and checklist published in previous research[2] was used. Initially, the questionnaire was clarified extensively and followed by the

observation of the participants while they were administrating the medication to their patients. The recorded data was likened and validated along with the order of doctor for recognizing errors.

Statistical Analysis: Data were analyzed using SPSS version 22. Logistic regression was carried out to analysis the result with demographic variables.

RESULTS

Out of 204 study participants, 98 (48%) were females and 168 (82.3%) were below 35 years. Only eight (3.9%) had age of 41 years and above. In respective of educational status, 133 (65.2%) of had general nursing diploma and remaining were bachelor or above degree of nursing. We noted that 97 (47.5%) subjects had experience of ≤ 5 years, 109 (53.4%) were performing their duties in morning and 95 (46.6%) were working in evening or night shift. Eighty (39.2%) participants had nurse to patient ratio were > 15 during medication administration.

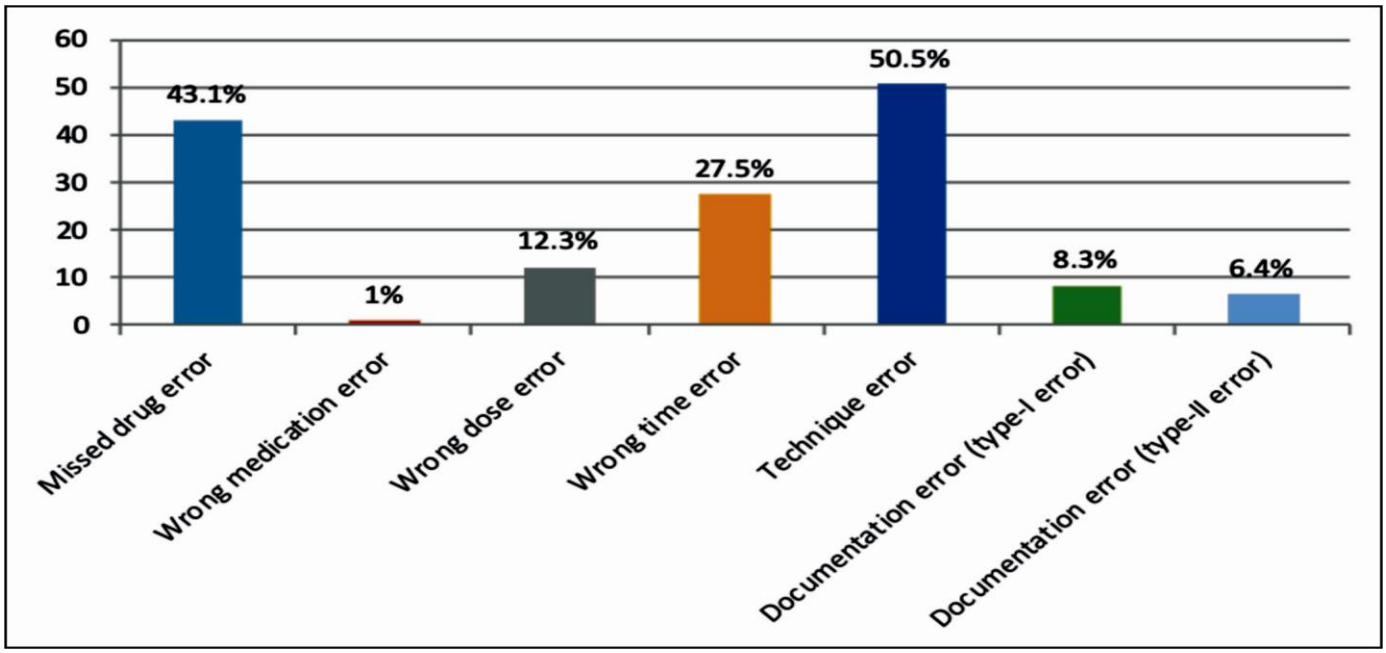

Fig. 1: Types of medication administration errors.

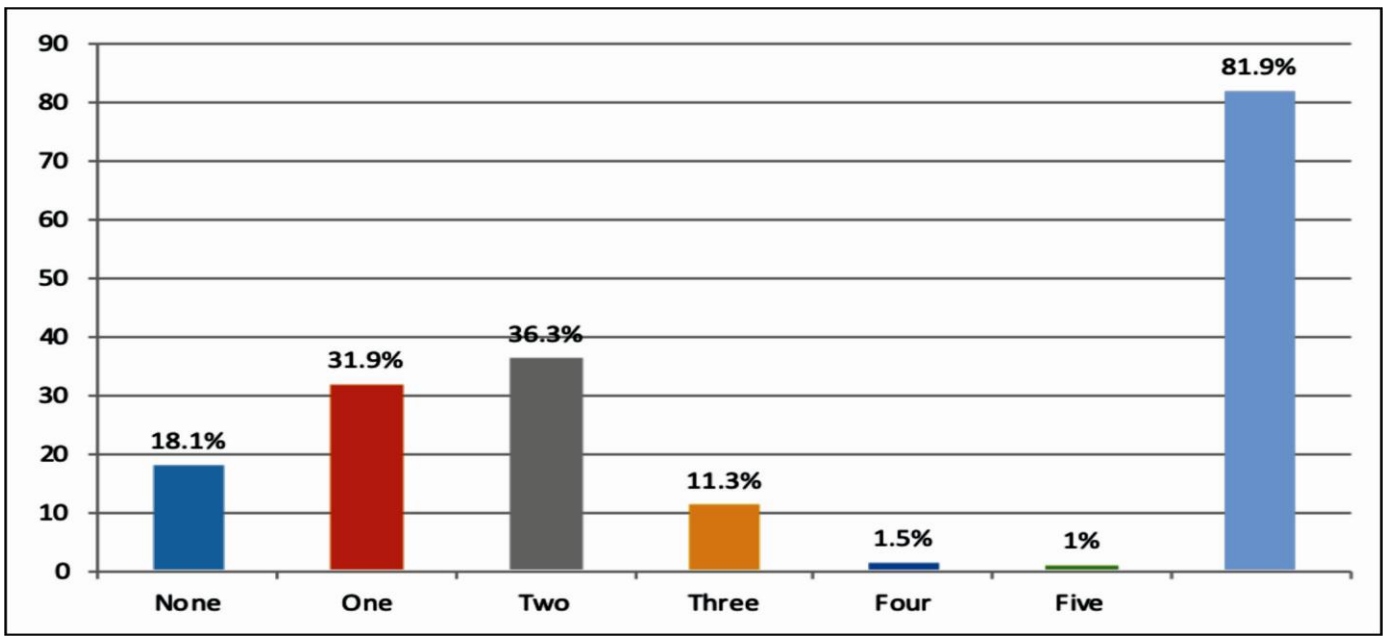

Fig. 2: Number of medication administration errors by individual nurse.

Table 1: Univariate logistic regression of medication administration errors with socio-demographic factors.

	B	S.E.	Wald	df	p-value	OR	95% C.I OR	
							Lower	Upper
Age								
25 – 30	.251	.487	.266	1	.606	1.286	.495	3.339
31 – 35	.387	.503	.593	1	.441	1.473	.550	3.943
36 – 40						Reference		
Gender								
Male	.701	.373	3.530	1	.060	2.015	.970	4.186
Female						Reference		
Education								
Diploma in Nursing						Reference		
BS. Nursing	.282	.394	.511	1	.475	1.325	.612	2.870
Hospital								
Dow University Hospital						Reference		
Civil Hospital Karachi	.263	.414	.404	1	.525	1.301	.578	2.932
Experience								
1 – 5 years						Reference		
6 – 10 years	-.459	.443	1.074	1	.300	.632	.265	1.505
> 10 years	-.246	.437	.318	1	.573	.782	.332	1.841
Patients Ratio								
1 – 10 patients						Reference		
11 – 15 Patients	-.428	.437	.961	1	.327	.652	.277	1.534
> 15 patients	.468	.457	1.048	1	.306	1.596	.652	3.909
Shift								
Morning shift						Reference		
Evening shift	-.151	.432	.122	1	.726	.860	.369	2.004
Night shift	.844	.528	2.558	1	.110	2.326	.827	6.547
Interruption								
No						Reference		
Yes	1.802	.390	21.347	1	.000	6.059	2.822	13.011
Patients Gender								
Male						Reference		
Female	.734	.370	3.936	1	.047	2.083	1.009	4.301

Commonest MAE were technique error and missed dose (Fig. 1). The frequency of MAE was 81.9% (Fig. 2). Male nurses were twice more into committing MAEs than their female nurses (OR: 2.015). Moreover, nurses

working in night shifts 2.32 times more errors than of day-light shift nurses (Table 1). It was also found in this study participants who were interrupted during medication administration carried out 6 times fold errors greater than those nurses of who were not interrupted. Feminine patients encountered 2.08 times more than masculine in MAEs from the study nurses.

DISCUSSION

The important goal present study was once to identify the magnitude of administration errors and its types. It is evident that MAEs are truly avoidable.[15] The present study found frequency of MAE to be 81.9%. Technique error and missed drug error was the most preeminent types of MAEs. This study frequency of MAEs of 81.9% is much higher than reported from Paris pediatric unit (31.3%), instructing health facility in Paris (27.6%), Netherland (21.2%) and Morocco Intensive care unit (ICU) (15.5%).[16,19]

This change may be due to wide variety of clinical devices measured. It was found in another study performed at ICU of Jimma University Hospital (JUH), in which the medication errors' magnitude was 51.8%, which is not as much as our findings.[20] The probable purpose for that the ICU may have been provided with infrequent attention by the hospital's staff, additionally, the nurse to patient ratio may also be reduced as compared to other units of the hospital.

A study from Taiwan disclosed the occurrence of MAE as 70%, somehow close to our findings.[21] Our study result is also in line the study accomplished at Pediatric Unit of JUH that had 89.9% prevalence of MAEs,[20] and nearer 68.7% to the studies from Pediatric wards in India.[22,23]

Present study was carried out in various wards like medical, surgical, ENT, Gynae, Orthopedic and pediatric, however, Indian and Ethiopian studies accomplished only in the pediatric units.

Our 81.9% prevalence is closer to the studies from in Australia[24] and Bahir Dar, Ethiopia.[2] This was also found that female patients involved 2.08 instances more as in contrast to male in MAEs from the nurses.

CONCLUSION

Medication administration errors remained extremely predominant in our tertiary care hospital settings of the Karachi. Technique error after that missed drug error was prominent types of errors.

Author Contributions:
Conception and design: Raja.
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Drafting of the article: Sajid Ali.
Critical revision of the article for important intellectual content: Sajid Ali, Pawan Kumar.
Statistical expertise: Badil.
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Conflict of Interest: None declared
Rec. Date: Dec 12, 2019 Revision Rec. Date: Mar 20, 2021 Accept Date: October 14, 2021.

REFERENCES

1. Al-Faouri IG, Hayajneh WA, Habboush DM. A five years retrospective study of reported medication incidents at a Jordanian teaching hospital: patterns and trends. Int J Human Soc Sci Res. 2014; 4: 280-7.
2. Feleke SA, Mulatu MA, Yesmaw YS. Medication administration error: magnitude and associated factors among nurses in Ethiopia. BMC Nursing, 2015; 14: 14-53.
3. Arun Kumar K, Venkateswarlu K, Ramesh A. A study of medication administration errors in a tertiary care hospital. Indian J Pharm Pract. 2011; 4: 37-42.
4. Parry AM, Barriball KL, While AE. Factors contributing to Registered Nurse medication administration error: A narrative review. Int J Nurs Stud. 2015; 52: 403-20.
5. Cebeci F, Karazeybek E, Sucu G, Kahveci R. Nursing students' medication errors and their opinions on the reasons of errors: A cross-sectional survey. J Pak Med Assoc. 2015; 65: 457-62.
6. Tabatabaee SS, Kohpeima Jahromi V, Asadi M, Kalhor R, Sharifi T. Ranking factors contributing to medication error incidents in private hospital: A nurse's perspective. Int J Curr Res. 2013; 2: 187-94.
7. Dabaghzadeh F, Rashidian A, Torkamandi H, Alahyari S, Hanafi S, Farsaei S, et al. Medication errors in an emergency department in a large teaching hospital in Tehran. Iran J Pharm Res. 2013; 12: 937-42.
8. Karthikeyan M, Balasubramanian T, Khaleel MI, Sahl M, Rashifa P. A Systematic Review on Medication Errors. Int J Drug Dev Res. 2015; 7: 9-11.
9. Taufiq S. Prevalence and Causes of Wrong Time Medication Administration Errors: Experience at a Tertiary Care Hospital in Pakistan. Can J Nurs Inform. 2015; 10: 1-12.
10. Bagheri-Nesami M, Esmaeili R, Tajari M. Intravenous Medication Administration Errors and their Causes in Cardiac Critical Care Units in Iran. Materia Socio-medica, 2015; 27: 442-6.
11. Alsulami Z, Conroy S, Choonara I. Medication errors in the Middle East countries: a systematic review of the literature. Eur J Clin Pharmacol. 2013; 69: 995-1008.
12. Sajjad S, Gowani A, Kazmi A, Mansoor S. Factors Contributing to Medication Errors in a Tertiary Care Private Hospital, Karachi. Imanagers J Nurs. 2017; 7: 28-35.

13. Ahmed T, Haq N, Ammar M. Assessment of inpatients omission errors made by nurses throughout the medication administration process. MOJ Toxicol. 2018; 4: 242-5.
14. Ahmed T, Haq N, Minhas M, Iqbal Q, Mehmood S, Waqas M, et al. Medication Administration Errors Evaluation in Pediatric Ward by Pharmacist. Int J Biol Sci. 2017; 4: 1-6.
15. Barker KN, Flynn EA, Pepper GA, Bates DW, Mikeal RL. Medication errors observed in 36 health care facilities. Arch Intern Med. 2002; 162: 1897-903.
16. Van den Bemt PM, Idzinga JC, Robertz H, Kormelink DG, Pels N. Medication administration errors in nursing homes using an automated medication dispensing system. J Am Med Inform Assoc. 2009; 16: 486-92.
17. 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; 12: 1-8.
18. Prot S, Fontan JE, Alberti C, Bourdon O, Farnoux C, Macher MA, et al. Drug administration errors and their determinants in pediatric in-patients. Int J Qual Health Care, 2005; 17: 381-9.
19. Benkirane RR, Redouane R, Haimeur CC, El Kettani SSEC, Azzouzi AA, Alaoui AAd, et al. Incidence of adverse drug events and medication errors in intensive care units: a prospective multicenter study. J Patient Saf. 2009; 5: 16-22.
20. Agalu A, Ayele Y, Bedada W, Woldie M. Medication administration errors in an intensive care unit in Ethiopia. Int Arch Med. 2012; 5: 1-6.
21. Chiang H-Y, Lin S-Y, Hsu S-C, Ma S-C. Factors determining hospital nurses' failures in reporting medication errors in Taiwan. Nursing Outlook, 2010; 58: 17-25.
22. Feleke Y, Girma B. Medication administration errors involving paediatric in-patients in a hospital in Ethiopia. Trop J Pharm Res. 2010; 9: 401-7.
23. Parihar M, Passi GR. Medical errors in pediatric practice. Indian J Pediatr. 2008; 45: 586-9.
24. Westbrook JI, Rob MI, Woods A, Parry D. Errors in the administration of intravenous medications in hospital and the role of correct procedures and nurse experience. BMJ Qual Saf. 2011; 20: 1027-34.