

Medication Administration Errors: A study of frequency and contributing factors among nurses working at tertiary care hospitals

Raja¹, Badil², Pawan Kumar³, Sajid Ali⁴, Hakim Shah⁵, Muhammad Fayyaz Awan⁶

ABSTRACT

Objective: To determine the frequency and contributing factors of medication administration errors among nurses in a tertiary care hospital.

Study Design: Cross-sectional analytical study.

Place and Duration: At Dr Ruth K M Pfau Civil Hospital and Dow University Hospital, Karachi, from the 1st January to 31st July 2018.

Methodology: Hospital based study was carried out on 204 nurses from both gender who have at least one year working experience through a Pre-tested questionnaire. Data related to different relevant demographic characteristics of study participants and factors contributing to medication administration errors were assessed.

Results: Among a total of 204 subjects studied, 52% of them were male and majority (82.3%) of them were below 35 years of age. The frequency of medication administration errors was found 81.9%. The variables which were found to have significantly associated with MAEs include Patients' gender (p-value=0.047) and working area i.e. wards of the nurses seemed to be statistically significant with medication administration errors (p-value <0.001).

Conclusion: Medication administration errors are prevalent having significant association with gender of the patients and working area (wards) of the nurses with medication administration errors.

Keywords: Nurses, Medication, Administration errors, Frequency, Contributing factors, Hospital.

How to Cite This:

Raja, Badil, Kumar P, Ali S, Shah H, Awan MF. Medication Administration Errors: A study of frequency and contributing factors among nurses working at tertiary care hospitals. *Isra Med J.* 2020; 12(3): 154-158.

This is an Open Access article distributed under the terms of the Creative Commons Attribution-Noncommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Medication administration errors (MAEs) are the leading issues

1. Staff Nurse of Plastic and Reconstructive Surgery, Dr. Ruth K.M. Pfau Civil Hospital, Karachi.
2. Assistant Professor of Nursing, Institute of Nursing, Dow University of Health Sciences, Karachi.
3. Assistant Professor of Medicine, Dow Medical College, Dow University of Health Sciences, Karachi.
4. Assistant Professor of Nursing, Benazir College of Nursing, Shaheed Mohtarma Benazir Bhutto Medical University Larkana.
5. Nursing Principal, Indus College of Nursing & Midwifery, Karachi.
6. English Lecturer, Sohail University, Jinnah College of Nursing, Karachi.

Correspondence:

Raja
Staff Nurse of Plastic and Reconstructive Surgery
Dr. Ruth K.M. Pfau Civil Hospital, Karachi.
Email: rajakhatri33@gmail.com

Received for Publication: January 16, 2020

1st Revision of Manuscript: July 11, 2020

Accepted for Publication: September 02, 2020

disturbing the quality of hospital services and decreasing the patient safety in health care system¹. MAE have severe consequences including prolonged hospital stay and death of the patient as well². Furthermore, medication therapy is the most frequent intervention used by nurses and safe medication administration is very difficult and vital task of the nurses³.

MAEs have been classified into different types including wrong medicine, wrong dose, administration of medication to the wrong patient, wrong route, wrong time, wrong dilution, missed dose, incorrect technique, and provision of medicine with no prescription of the doctor^{4,5}.

A study was accomplished in USA which revealed that due to medication related adverse effects about 117, 000 patients were hospitalized annually⁶. In addition, thousands of hospitalized patients expire annually range from 44,000 to 98,000 in America only, due to medication or some other medical errors, additionally, for the management of such kinds of problems approximately 77 million dollars being extra cost is going to utilizing annually^{7,8}. In spite of that almost half of the medication related events are preventable⁹.

It is established by a recent research study that leading kind of error is administration of the wrong dose that reported 34.8%¹⁰. However, another research documented that common kind of error is wrong time error, missed dose and unauthorized medication error that is 72.6%, 14% and 3.7% respectively⁴. Causal factors, which can lead to the MAEs including high

workload, shortage of nurses, interruption to the nurses during medication administration, lack of knowledge related to pharmacology, inexperienced nurses, improper communication between healthcare workers, illegible writing of doctors, careless attitude, and inappropriate work division^{11,12}.

It is affirmed by research study that MAEs are more common in public sector hospitals⁶. Furthermore, in Pakistan nurse to patient ratio is not according to the guidelines of Pakistan Nursing Council¹³, it is also recognized that nurse-patient ratio is 1:50 in hospital setting¹⁴. Furthermore, it has also been discovered that distraction, interruption and heavy workload are the causative factors of MAEs¹⁵. It is an alarming state for the hospitals to magnify such types of problems but it is equally important that decisive steps should be taken to tackle the problem for the patient's safety.

Due to the pivotal role of nurses in the medication administration and shortage of nurses, they are either being the source of error or contributor of error. Medication administration error is a major risk factor for patient safety, which may cause a poor patient's outcome in term of lengthy hospital stay, discomfort, severe harm, and death. Identifying and examine the associated factors will help to adopt appropriate measures to prevent the occurrence of medication administration error ultimately keep the patient safe. The objective of our study is to determine the frequency and contributing factors of medication administration errors among nurses in a tertiary care hospital.

METHODOLOGY

This hospital based analytical cross-sectional study was conducted at Dr Ruth K M Pfau Civil Hospital (CHK) Study was carried out over a period of seven months from the 1st January to 31st July 2018. Data was also collected from another tertiary care hospital ie Dow University Hospital (DUH), Karachi. Open Epi version 3.0 was used for sample calculation taking 56.4% prevalence of MAE¹⁶. Nurses having at least one year working experience and subjects having valid license from Pakistan Nursing Council were enrolled for the study. The nurses who had contract job and having less than one year clinical experience and unwilling to participate were also excluded from the study. Subjects were approached through non-probability purposive sampling method. Written informed consent was obtained from all participants. Subject's participation was voluntary. Confidentiality of subjects were assured and Ethical endorsement was obtained from Institutional Review Board (IRB).

Data was collected by utilizing validated questionnaire which was adopted from previously conducted study in Ethiopia as well as permission of proforma using was obtained. Demographic data like age, gender, years of experience, place of duty etc was taken through interview from all participants and followed by direct observation of the nurses by principal investigator during medication administration to the patients. During study period the drug administration errors and factors leading to them were evaluated, compiled in a given proforma and analysed at the end of study.

Operational Definition of Medication administration error: The

disparity between what the patient got and what the prescriber actually written in the patients file; such as dose, drug, strength, time, missed drug, technique, route documentation errors of the medicine that occurs while the time of administering IV, IM, SC, and PO medication to the patient by the nurse.

Data Analysis: Data entry and analysis was done by SPSS version 21.0. Qualitative variables such as gender, educational status, shift duty, working zone, and patient's gender were presented in frequency and percentages. While, quantitative variables including participant's age, working experience, nurse to patients' ratio, patients' age were showed in mean and standard deviation (SD). Association of MAEs with demographic variables amongst nurses were computed by using chi-square test.

RESULTS

A total of 204 nurses were studied among them majority were male (52%, n=106) as compared to female (48%, n=98) and 80 (39.2%) of the respondents had age less than 35 years. Two-third (n=133, 65.2%) of participants education was diploma in general nursing and remaining of them were bachelor's degree of nursing. Almost half (47.5%, n=97) of the participants had experience below 5 years. Nearly half 95 (46.6%) of the participants were working in evening and night shift and rest of participants (53.4%, n=109) were working in morning shift (Table-I).

Table-I: Socio-demographic characteristics of study participants (N=204)

Variables	Demographic factor	n (%)
Age (year)	25-30	88 (43.1%)
	31-35	80 (39.2%)
	36-40	28 (13.6%)
	More than 40	8 (3.9%)
Gender	Male	106 (52.0%)
	Female	98 (48.0%)
Education	Diploma in Nursing	133 (65.2%)
	BS. Nursing	71 (34.8%)
Experience	1- 5 years	97 (47.5%)
	6- 10 years	49 (24.0%)
	> 10 years	58 (28.5%)
Working Area	Surgical ward	57 (27.9%)
	Medical ward	66 (32.4%)
	ENT ward	27 (13.2%)
	Ortho ward	16 (7.8%)
	Gynae ward	21 (10.3%)
	Neurology ward	2 (1.0%)
	Pediatric ward	2 (1.0%)
	Private & Semi Pvt room	13 (6.4%)
Patient-Nurse ratio	1 - 10 patients	70 (34.3%)
	11 - 15 Patients	54 (26.5%)
	>15 patients	80 (39.2%)
Shift	Morning shift	109 (53.4%)
	Evening shift	44 (21.6%)
	Night shift	51 (25.0%)

Table-II: Association of MAEs with socio-demographic factors (N= 204)

Variables	Medication Administration Errors		Chi-Square	p-value	
	No Error. n (%)	Error. n (%)			
Age (In years)	25-30	16 (18.2%)	72 (81.8%)	0.59	0.742
	31-35	13 (16.2%)	67 (83.8%)		
	≥36	8 (22.2%)	28 (77.8%)		
Gender	Male	14 (13.2%)	92 (86.8%)	3.612	0.057
	Female	23 (23.5%)	75 (76.5%)		
Education	Diploma in Nursing	26 (19.5%)	107 (80.5%)	0.513	0.474
	BS. Nursing	11 (15.5%)	60 (84.5%)		
Experience	1- 5 years	15 (15.5%)	82 (84.5%)	1.107	0.575
	6- 10 years	11 (22.4%)	38 (77.6%)		
	> 10 years	11 (19%)	47 (81%)		
Working Area (Wards)	Surgical ward	6 (10.5%)	51 (89.5%)	34.629	<0.001
	Medical ward	8 (12.1%)	58 (87.9%)		
	ENT ward	6 (22.2%)	21 (77.8%)		
	Ortho ward	1 (6.2%)	15 (93.8%)		
	Gynae ward	13 (61.9%)	8 (38.1%)		
	Neurology	0 (0%)	2 (100%)		
	Pediatrics	1 (50%)	1 (50%)		
Nurse to Patients Ratio	1 - 10 patients	13 (18.6%)	57 (81.4%)	3.927	0.14
	11 - 15 Patients	14 (25.9%)	40 (74.1%)		
	>15 patients	10 (12.5%)	70 (87.5%)		
Time of Medication Administered	10:00 AM	22 (20.2%)	87 (79.8%)	3.317	0.19
	2:00 PM	10 (22.7%)	34 (77.3%)		
	10:00 PM	5 (9.8%)	46 (90.2%)		
Patient Gender	Male	15 (13.3%)	98 (86.7%)	4.035	0.045
	Female	22 (24.2%)	69 (75.8%)		
Patient Age	< 18 years	5 (12.8%)	34 (87.2%)	0.918	0.338
	> 18 years	32 (19.4%)	133 (80.6%)		

Table-II demonstrates the association of MAEs with socio-demographic characteristics of the study participants. This table confirmed that more male nurses committed more MAEs than female nurses, the relationship of gender variable with MAEs was not statistically significant but close to significance level (p-value=0.057). Working area i.e. wards of the nurses is seemed to be statistically significant with MAE, the percentage of nurses in all the reported areas committed greater MAEs than who did not. MAEs associated with other variables revealed statistical significant with patients gender (p-value=0.045), female patients are less encountered than male patient in MAES from nurses.

DISCUSSION

Occurrence of MAEs is not preventable until sources can be identified. In our study, we investigated MAEs association with demographic information of the nurses. Majority of study participants were male (52%) this result was lower than study conducted in Ethiopia showed 77%¹⁶. Although, there is difference in percentage but it is proven that male nurses commit more MAEs. The other findings showed 82.3% of the participants belong of age group less than 35 years, this result was similar to another study conducted in Ethiopia¹⁷. In this study approximately 48% participants had less than 5 years

clinical experience, slightly higher (65%) proportion was found in a study conducted in Iran¹⁸.

Present research study revealed that the frequency of MAEs was found 81.9%; which was much higher than reported in literature from other parts of world i.e. from Morocco Intensive Care Unit (15.5%), Netherland (21.2%), United State (6.6%) and a teaching hospital in France (27.6%).¹⁹⁻²¹ One of the probable reasons for this difference might be the different clinical units considered where these studies were performed by considering only in certain areas. Furthermore, dissimilar to our setting, these researches were completed in advanced countries that have a voluntary error reporting system, digital system of recording and dual inspection of unsafe medications. In current study 65.2% of the study subjects education was diploma in nursing, this result was similar to other study conducted in Kenya²². This result indicated that there is a need for more in-service education training for (diploma) nurses on safe drug administration module. On the other hand, study conducted in Ethiopia highlighted the participants who had Bachelor degree in nursing or above were more prone to MAEs. It is may be due to confidence for their education and have self-belief for the management of any misshape²³. In research studies^{24,25} it was reported that shortage of nurses is a risk factor for medication error, similarly in our study it is highlighted that more error

recorded in those participants (87.5%) who administered medication to more than 15 patients. Hence, MAEs statistically significant in the functional area of the nurses (p -value= <0.001), In each ward quantity of MAEs was greater, which cause to increase MAE percentage, these results are also supported by study conducted in a private hospital in Pakistan where each ward were more errors²⁶, whereas, other study conducted in Malaysia found nurse working in intensive care unit commit less medication error²⁷. This difference is because nurse patient ratio is different in intensive care unit and wards. In wards, nurses workload is more, therefore they are more prone to cause medication errors. The above finding suggest that there is a need to implement in-service education program related to safe medication administration module especially for young male nurses working in ward setting. In this research study we have not found any statistically significant association between age of the nurses, hospital, work experience and MAEs. Similarly this finding is supported by study accomplished in Iran²⁸.

In summary, we observed a high prevalence of MAEs which affects quality of care of patients. Therefore, we need to develop aggressive interventions to control medication error incidents in government hospitals by providing educational guidelines for the staff nurses. In addition, there is a need to share the medication incident report while maintaining confidentiality with other staff so they will take extra precautions while administering medication to their patients. The other recommendation is revising nurse-patient ratios in ward setting. Furthermore, studies need to be conducted to find out the types and causes of medication error.

CONCLUSION

Medication administration errors are prevalent having significant association with gender of the patients and working area (wards) of the nurses with medication administration errors.

Acknowledgement: Our heartfelt thanks goes to Senafikish Amsalu and his team Feleke University of Gondar for support in questionnaire and study participants who voluntarily participated in this study.

AUTHOR'S CONTRIBUTION

Raja: Conceived idea, Manuscript writing.

Badil: Data Collection, Data analysis

Kumar P: Manuscript writing

Ali S: Literature search, Data collection

Shah H: Designed research methodology, Data collection

Awan MA: Critical revision, Final approval of manuscript

Disclaimer: None.

Conflict of Interest: None.

Source of Funding: None.

REFERENCES

1. Matin BK, Hajizadeh M, Nouri B, Rezaeian S, Mohammadi M, Rezaei S. Period prevalence and reporting rate of medication errors among nurses in Iran: A systematic review and meta-analysis. *J Nurs Manag.* 2018;26(5):498-508.
2. Zeleke A, Chanie T, Woldie M. Medication prescribing errors and associated factors at the pediatric wards of Dessie referral hospital, Northeast Ethiopia. *Int Arch Med.* 2014;7(1):18. doi:10.1186/1755-7682-7-18
3. Jember A, Hailu M, Messele A, Demeke T, Hassen M. Proportion of medication error reporting and associated factors among nurses: a cross sectional study. *BMC Nurs.* 2018; 17(1):9. doi.org/10.1186/s12912-018-0280-4
4. 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):60.
5. Arun Kumar K, Venkateswarlu K, Ramesh A. A study of medication administration errors in a tertiary care hospital. *Int J Pharm Pract.* 2011;4(2):37.
6. Budnitz DS, Pollock DA, Weidenbach KN, Mendelsohn AB, Schroeder TJ, Annet JL. National surveillance of emergency department visits for outpatient adverse drug events. *Jama.* 2006 18;296(15):1858-1866.
7. Ehsani SR, Cheraghi MA, Nejati A, Salari A, Esmailpoor AH, Nejad EM. Medication errors of nurses in the emergency department. *J Med Ethics Hist Med* 2013;2-7.
8. Agrawal P, Sachan A, Singla RK, Jain P. Statistical Analysis of Medication Errors in Delhi, India. *Indo Global J Pharm Sci.* 2012;2(1):88-97.
9. Westbrook JI, Li L, Lehnbohm EC, Baysari MT, Braithwaite J, Burke R, et al. What are incident reports telling us? A comparative study at two Australian hospitals of medication errors identified at audit, detected by staff and reported to an incident system. *Int J Health Care Qual Assur.* 2015;27(1):1-9.
10. 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(4):995-1008.
11. Keers RN, Williams SD, Cooke J, Ashcroft DM. Causes of medication administration errors in hospitals: a systematic review of quantitative and qualitative evidence. *Drug Safety.* 2013; 1;36(11):1045-1067.
12. Salmasi S, Khan TM, Hong YH, Ming LC, Wong TW. Medication errors in the Southeast Asian countries: a systematic review. *PloS one.* 2015;10(9):e0136545.
13. Jafree SR, Zakar R, Zakar MZ, Fischer F. Nurse perceptions of organizational culture and its association with the culture of error reporting: a case of public sector hospitals in Pakistan. *BMC Health Serv Res.* 2015;16(1):3.
14. Badil B, Shah H, Ali SA, Siddiqui A. Occupational Stress among Nurses of Tertiary Care Hospitals in Karachi, Pakistan. *J Dow Univ Health Sci.* 2016;10(3): 96-100
15. 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 Sci Res in Biol Sci.* Vol. 2017;4:2.

16. Feleke SA, Mulatu MA, Yesmaw YS. Medication administration error: magnitude and associated factors among nurses in Ethiopia. *BMC Nurs.* 2015; 14(1):53. DOI: 10.1186/s12912-015-0099-1.
17. Fekadu T, Teweldemedhin M, Esrae E, Asgedom SW. Prevalence of intravenous medication administration errors: a cross-sectional study. *Integr Pharm Res Pract.* 2017;6: 47–51
18. Musarezaie A, Momeni GG, Zargham BA, Haj SE. Survey of the medication errors and refusal to report medication errors from the viewpoints of nurses in hospitals affiliated to Isfahan University of medical sciences, Iran. *J Health System Res* 2013 ;9:76-85.
19. 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(4):486-492.
20. Latif A, Rawat N, Pustavoitau A, Pronovost PJ, Pham JC. National study on the distribution, causes, and consequences of voluntarily reported medication errors between the ICU and non-ICU settings. *Crit Care Med.* 2013; 41(2):389-398.
21. 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(1):16-22.
22. Simiyu KN, El-Banna HM, Fattah MA, Omondi LA. Nurses' Medication Administration Errors at Medical Surgical Units. *Am J Nurs Sci.* 2018, 7 (3): 88-99. doi: 10.11648/j.ajns.20180703.12
23. Bifftu BB, Dachew BA, Tiruneh BT, Beshah DT. Medication administration error reporting and associated factors among nurses working at the University of Gondar referral hospital, Northwest Ethiopia, 2015. *BMC Nursing.* 2016: 15(1):43.
24. 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(3):28.
25. 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 Hosp Res.* 2013;2(4):187-194.
26. Taufiq S. Prevalence and Causes of Wrong Time Medication Administration Errors: Experience at a Tertiary Care Hospital in Pakistan. *Can. J. Nurs. Res.* 2015; 10 (2):1-8
27. Ong WM, Subasyini S. Medication errors in intravenous drug preparation and administration. *Med J Malaysia.* 2013;68(1):52–56.
28. Cheragi MA, Manoocheri H, Mohammadnejad E, Ehsani SR. Types and causes of medication errors from nurse's viewpoint. *Iran J Nurs Midwifery Res.* 2013: 18(3):228.