

Nurses' experiences and perceptions of medication administration errors

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Abstract

Background and objective: Medication administration errors are the most common medical errors that happen in hospital settings. This study aimed to find out the most common types of medication administration errors done by the hospital nurses and identifying factors that lead to medication administration errors.

Methods: This cross-sectional survey was conducted across Erbil teaching hospitals over a period of three months from June 2016 to September 2016. A convenience sample of 250 nurses who were working in acute, subacute, and general wards and had direct contact with the medication administration were included in this study. Data were collected using a self-reported questionnaire.

Results: According to this study the most common types of medication errors were, noticing allergy after drugs administration and administering drugs at a wrong time. The highest leading factors of medication administration errors were illegible medication orders of the physicians, lack of adequate staffing and workload. High statistical differences were found between the frequency of medication administration errors with nurses' educational level, overall working experience, and nurses understanding language.

Conclusion: This study concluded that medication administration errors have multiple causes and types of errors are various.

Keywords: Medication administration error; Nurses' experience; Nurses' perspective.

Introduction

Medication administration errors (MAEs) are the most common medical error that happens in hospital settings.¹ According to some observational studies, the incidence of MAEs varies between 10.5% to 44.6% of all administered doses.²⁻⁴ This figure indicates that errors occur in approximately one in five medications administered by nurses in healthcare settings. In developed countries like the United States of America, it has been estimated that approximately 7000 people die as a result of medication related-errors annually.⁵ The negative consequences of medication errors are not just affecting patients' health but may result in loss of confidence in the healthcare system, psychological distress among health care workers, prolonged hospital stay, and increase in treatment cost.^{6,7} Most of these errors happen as a result

of human fault.⁸ In hospitals, different numbers of physicians, pharmacists, and nurses are involved in the process of medication preparation and administration.⁹ However, nurses are responsible for the biggest part of the medication process, which is the administration part.¹⁰ They are the gatekeepers who continually assess and evaluate patients' safety by maintaining active surveillance over the process of medication administration.^{11,12} Therefore, when errors happen nurses take the responsibility at a first place. Patient safety is a first goal-directed plan in many academics and healthcare organizations; therefore, a different strategic plan has been demonstrated to prevent the occurrence of MAEs. However, errors continue to occur.¹³ Various systemic and individual factors have been linked to

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MAEs.¹¹ Mahmood, Chaudhury, and Valente¹⁴ reported that lack of knowledge of health staff, work overload, the stress of healthcare professional and lack of staffing have a significant relationship to MAEs. Physical and environmental related factors like lack of medical equipment; lack of space for storing, preparing and documenting medications are related to MAEs as well.² Lack of privacy in nurses' working area which resulted in interruption of health staff by patients, relatives, visitors and telephone calls during medication preparation and administration are other factors that have a relationship to MAEs.¹⁵ Poor communication between nurses and other healthcare providers such as physicians and pharmacists had a significant role to MAEs in a study done by Kim, et al.¹⁶ Failure in reporting the incidence and seriousness of medication errors in the healthcare setting reduces hospital safety and cause patients to be vulnerable to harm at any time.¹⁷ In Erbil, MAEs frequently happen, which require an immediate strategic plan to develop an interventional method that is capable of tackling medication safety issue effectively. In order, to implement strategic plan evidence about key factors contribute to MAEs, and common types of MAEs is needed.^{18,19} However, in Kurdistan region, reliable statistical data about MAEs is difficult to obtain. Basic information about causes and types of MAEs is not available because of lack of research; in addition, incidences of MAEs are usually not reported in teaching hospitals. Therefore, this study aimed to find common types of MAEs done by the study participants with identifying factors that lead to MAEs.

Methods

This descriptive cross-sectional survey aimed to provide information regarding nurses' experiences and perceptions of medication administration errors. The study was conducted across Erbil teaching hospitals, including Rizgary Teaching Hospital, Hawler Teaching Hospital, East

Emergency and Cardiac Center over a period of two months from June 2016 to August 2016. A convenience sample of 276 nurses who were working in acute, subacute, and general wards and had direct contact with the medication administration were asked to participate in this study. In total, 250 questionnaires were submitted to data analysis. Ethical consideration was obtained from the Scientific and Higher Education Committee of the College of Nursing, Hawler Medical University. Prior to data collection, the aim of the study was explained to the study participants, and they were assured that their participation would be kept anonymous and the provided data will be used for the research purpose only. The data were collected using a self-reported questionnaire which was consisted of three parts. First part was socio-demographic data developed by the study authors which included age, gender, marital status, level of education, working experience, working hours/shift, working shift, hospital ward which was categorized to three parts according to their acuity level; acute (RCU, CCU, ICU and neonatal care), subacute (Burn, Oncology, Dialysis center) and general ward (Outpatient department, Surgical ward, Neurology ward, Medical ward, Urology ward, Orthopedic ward, Catheterization care, Postpartum and Delivery room) and questions regarding the most comprehensible language by the study participants were included in the demographic data as well. The second part was common types of nurses' medication administration errors which consisted of 10 items. It was developed after reviewing relevant, and the third part was 26 statements regarding why medication administration errors happen obtained from a tool developed by Wakefield et al.²⁰ called Medication Administration Errors (MAEs). The statements were divided into four groups; hospital-related factors, nurse-related factors, physician-related factors and medication with pharmacy-related factors. The questionnaire was

extensively reviewed by research committee at the college of nursing for its validity and relevancy then it was translated to the Kurdish language with minor changes in some words to make it more comprehensible for the study participants. The translation has been done by the study authors then reviewed by an assistant professor specialized in Kurdish and medical terminology. For data analysis, the statistical package for the social sciences

(version 23) was used. Descriptive statistic was used to show the frequencies and percentage of independent and dependent variables, and to find the influence of nurses' characteristics on the frequency of MAEs, Chi square test was employed, and *P* value set significant at 0.05.

Results

Table 1 demonstrates that out of the 250 recruited nurses, more than half

Table 1: Study participants' sociodemographic characteristics.

Characteristics	Frequency N=250	(%)
Gender		
Male	122	48.8
Female	128	51.2
Age group		
22---30	104	41.6
31---39	93	37.2
40---48	36	14.4
49---56	17	6.8
Marital status		
Single	67	26.8
Married	175	70.0
Divorced	5	2.0
Widowed	3	1.2
Level of education		
Trained nurse	13	5.2
High school nurse	45	18.0
Diploma in nursing	133	53.2
Bachelor in nursing	55	22.0
Master in nursing	4	1.6
Years of experience		
1---9	144	57.6
10---18	61	24.4
19---27	29	11.6
28---36	16	6.4
Hospital ward		
Acute	78	31.2
Subacute	35	14.0
General ward	137	54.8
Working hours		
5---8 hr.	175	70.0
9---11hr.	4	1.6
12---14 hr.	71	28.4
Working shift		
Morning	119	47.6
Evening	56	22.4
Night	75	30.0
How many languages do you know?		
Only Kurdish	37	14.8
Kurdish and Arabic	113	45.2
Kurdish, Arabic and English	80	32.0
Kurdish and English	20	8.0

(n=128; 51.2%) were female. The age of nurses ranged from 22 to 56 years with mean age of 33.91 (SD=7.6), and about two third of them were married (n=175; 70%). The greatest percentage (53.2%) of nurses were holding a diploma in nursing, whereas only 5.2% were trained nurse and 18% were a high school nurse. The percentages of nurses who were holding bachelor and master degree in nursing were 22% and 1.6% respectively. More than half of the nurses 57.6% had working experience of one to nine years with a majority of them were working in general wards (n=137, 54.8%). Nearly half (n=119, 47.7%) of the study participants had a morning shift, and 70% of them were working five to eight hours per shift. The Kurdish and Arabic languages were the most understandable languages as it was stated by 45.2% of the study participants while the percentage of nurses who understood Kurdish, Arabic and English language was 32%. A total of 14.8% understand only

the Kurdish language, and 8% stated that the Kurdish and English languages are more understandable for them. Table 2 illustrates common types of MAEs. According to this study, the majority of nurses 58.4% reported that they have noticed allergy after they administered medications and about half of them (47.2%) stated that they administered medications at wrong times. The percentage of nurses who had errors regarding wrong patients and wrong drugs was 30% equally while the omission of the dose and the wrong dose was 79% and 81% respectively. About one-quarter (24.8%) reported that they administered medications at wrong routes and their errors regarding additional or unauthorized doses were 26.1%. Fewer errors were made by the study participants regarding administering expired drugs and giving medications despite contraindications with a percentage of 14% and 14.4% respectively.

Table 2: Types of medication administration errors experienced by the nurses (N=250).

Types of medication administration errors	No.	(%)
Wrong patient	75	30.0
Wrong drug	75	30.0
Omission of dose	79	31.6
Wrong dose	81	32.4
Wrong time	118	47.2
Expired drug	35	14.0
Wrong route	62	24.8
Additional/ unauthorized dose	54	26.1
Medicine given despite contra-indications	36	14.4
allergy to medication noted	146	58.4

Regarding factors associated with MAE (Table 3), the greatest number (219) of the study participants reported that "Physicians' medication orders are not legible" and "Lack of adequate staffing compared to the number of patients" are major factors of medication administration error with agreement rate (87.6%), (87.2%)

followed by "Workload" (agreement rate n=211, 84.4%), while the lowest reported factor was "Pharmacy does not prepare medications correctly" (n=84, 33.6%). In general, the study showed that the nurses had high agreement rates across all types of factors that attribute to the occurrence of errors while administering medications.

Table 3: Nurses' perception of factors associated with medication administration error.

Factors	Agreement rates	
	No.	(%)
Hospital related factors:		
Lack of adequate staffing compared to the number of patients.	218	87.2
Patient acuity levels.	166	66.4
Workload	211	84.4
Inadequate access to the policy of medication administration.	148	59.2
Lack of drug preparation facilities	120	48.0
Organizational routines	165	66.0
Nurses related factors:		
Lack of knowledge about medications	175	70.0
Lack of understanding of how errors occur	150	60.0
Failure to adhere to policy and procedure documents	163	65.2
Distractions during preparation and administration of drug	120	48.0
Lack of documentation before and after administration	131	52.4
Stress	194	77.6
Poor communication between nurses	106	42.4
Physician related factors:		
Physicians' medication orders are not legible	219	87.6
Physicians change orders frequently	205	82.0
Abbreviations are used instead of writing the orders out completely.	180	72.0
Verbal orders are used instead of written orders.	160	64.0
Poor communication between physicians and nurses	170	68.0
Medication and pharmacy related factors:		
The names of many medications are similar	120	48.0
Different medications look alike	132	52.8
The packaging of many medications is similar	144	57.6
Medications are written under different language	132	52.8
Pharmacy delivers incorrect doses to the unit	107	42.8
Pharmacy does not prepare the medication correctly	84	33.6
Pharmacy does not label and document medication correctly.	109	43.6
Poor communication between pharmacists and nurses	190	76.0

Table 4, show no significant association between gender and MAEs ($P = 0.156$), while there was a highly significant association between level of education and MAEs ($P = 0.001$), this indicates, nurses who were holding bachelor and master degrees were less vulnerable to MAEs. The association between the overall years of experience and frequency of MAEs was also significant at $P = 0.009$. Nurses with more working experience reported more MAEs. The language was also related to MAEs, and it has statistically reached significance at $P = 0.004$, nurses who could understand Kurdish, Arabic, and English; and those who understood Kurdish and English were reported less MAEs.

Discussion

This study has examined nurse's experiences with the frequency of medication administration errors and nurses' perception of why errors happen

during medication administration. In this study, 250 nurses were recruited from different department across Erbil teaching hospitals, Kurdistan region/ Iraq. The study found "noticing allergy after administering medication" was the most frequent error committed by the study participants. The percentage of this error is consistent with a study done by Morimoto et al.,^{21,22} who also stated that this error usually happens as a result of not taking history regarding drug allergy, drug-drug interaction, not testing skin for drug sensitivity, administering the wrong dose, wrong drug and wrong technique. The percentage of administering drugs at a wrong time in this study was also high (47.2%), this percentage is similar to a study done by Saleh et al.,²³ Agalu et al.²⁴ and Biron.²⁵ Wrong timing has been linked to lack of staffing in some studies^{26,27} in which they reported that because of inadequate staffing, nurses had to administer

Table 4: MAEs by demographic variables.

Variables	MAEs N(%)	No MAEs N(%)	P value
Gender			
Male			
Female	111(91)	11(9)	0.156
	109(85.2)	19(14.8)	
Level of education			
Trained nurse	11(84.6)	2(15.4)	0.001
High school nurse	43(95.6)	2(4.4)	
Diploma in nursing	128(96.25)	5(3.8)	
Bch in nursing	38(69.1)	17(3.9)	
Master in nursing	0(0.0)	4(100)	
Years of experience			
1---9	120(83.3)	24(16.7)	0.009
10---18	56(91.8)	5(8.2)	
19---27	29(100)	0(0.0)	
28---36	15(93.8)	1(6.3)	
Language			
Only Kurdish	34(91.9)	3(8.1)	0.004
Kurdish & Arabic	107(94.7)	6(5.3)	
Kurdish, Arabic & English	64(80)	16(20)	
Kurdish & English	15(75)	5(25)	

$P < 0.05$

medication either earlier or later than the actual time of administration. This study has revealed four categories involved with MAEs; hospital related factors, nurse related factors, physician-related factors and medication with pharmacy related factors. Physician-related factors "illegibility of physician's medication order" was the most reported cause of MAEs. In a number of studies, nurses admitted that unclearness in written prescription order was responsible for MAEs.²⁸⁻³² According to a study done in the USA unclearness in written prescriptions orders led 150 million pharmacists to call the responsible doctor for further information about the prescription.³³ Errors usually happen in prescriptions either when writing drug name, dose, frequency or route.²⁸ Second and third major factors of MAEs according to this study were the lack of adequate staffing and workload "hospital related factors". In six studies nurse shortage was reported to be one of the main causes that might lead to MAEs.³⁴⁻³⁸ On the other hand, heavy staff workloads in three studies appeared to be a major leading factor to MAEs.³⁹⁻⁴¹ Many studies have linked nurse shortage with increased workloads which in turn are both related MAEs.^{30,32} Stratton et al.²⁹ and Dornan et al.⁴² stated that physical exhaustion and fatigue as a result of poor staffing and high workload are among the most frequently contributing factors to medication error. The analysis of the current study showed no statistically significant relationship between MAEs and gender. However, this data disagrees with a result found by Aboshaiqah⁴³ who found a significant difference between the frequency of medication errors and gender in which the frequency of medication errors among female were higher than male. The result of this study demonstrates that nurses with higher education level had less MAEs. This result can be supported by a study done by Blegen et al.⁴⁴ that found that higher education level is associated with better patient outcome. In their study, if a nurse had a bachelor degree or higher,

the number of MAEs decreased significantly.⁴⁴ However, this result does not indicate that high level educated nurses do not need theoretical and practical experience or workshop about delivering medication safely. Because according to a study done by Stratton et al.,²⁹ the association between increased frequency of medication error and the high educational level was significantly high. When it comes to practice environment, nurses work gets influenced by the lack of staff, workload, hospital facility and nurses' relationship with physicians and pharmacist; therefore, having high certificates is not enough to avoid medical errors. Despite this result, there are other studies which found no correlation between MAEs and level of education.^{31,44} With regard to the study participants' overall years of experience, the frequency of medication errors among nurses who had more experience in clinical practice was significantly high compared to those with fewer years of practice. This finding is paralleled with a survey done by Sears⁴⁵ and Kim et al.⁴⁶ Vojir et al.,⁴⁷ in a survey stated that nurses with high years of experience have more ability to detect errors while administering medication, thus lead to a higher reporting rate. Another statistically significant association was found between nurses understanding language and frequency of MAEs. Those who were bilingual (Kurdish and English) and trilingual (Kurdish, Arabic and English) had less error. The Kurdish language is a first and official language in Kurdistan region. However, in the medical field and hospital, Kurdish, Arabic and English language are used. Therefore, nurses need to understand all these languages to avoid mistakes. Even though, more than half (52.8%) of nurses in this study reported that "medications are written under different language" is one of a leading cause of MAEs. This factor has never been investigated in previous studies. The purpose of studying this factor in this survey was because of the majority of

drugs used in Kurdistan's hospitals are imported from foreign countries, namely, India, Iran, Emirate, United Kingdom, Turkey, Syria, Saudi Arabia and Sweden.⁴⁸ Therefore, nurses find difficulty in dealing with all these different languages. This study has several limitations. First, the sample size was small to be generalized for all nurses worked in selected hospitals in this study. Second, there was a reliance on self-reported questioner that would be difficult to prevent nurses to show their preferable image. Furthermore, the adverse effects of studied medication errors have not been investigated. Therefore, these limitations need to be considered in future research.

Conclusion

According to this study noticing allergy after drug administration and administering drugs at wrong times were the most frequent errors reported by the nurses. Regarding leading causes of MAEs, this study concluded that illegible medication orders of the physicians, lack of adequate staffing and workload were the highest leading factors to MAEs. Therefore, it can be concluded that MAEs have multiple causes and types of errors are various. In addition, high statistical differences were found between the frequency of MAEs with nurses' educational level, overall working experience, and the nurses' most understanding language. In light of these results, Erbil teaching hospitals need to design an interventional program where all the staff are encouraged to report MAEs to know the frequency and severity of this issue whereby an action plan can be developed to overcome this issue.

Competing interests

The authors declare that they have no competing interests.

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