

## Evaluation of Medication Errors by Nurses in Hospitals Affiliated with Mashhad University of Medical Sciences, Mashhad, Iran

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ARTICLE INFO	ABSTRACT
<p><b>Article type:</b> Original Article</p> <hr/> <p><b>Article history:</b> Received: 02- Feb-2016 Accepted: 23- Feb -2016</p> <hr/> <p><b>Keywords:</b> Hospitals Mashhad University of Medical Sciences Medication errors Nurses</p>	<p><b>Introduction:</b> Medication error is one of the quality problems in hospitals harming millions of people around the world every year. This study aimed to investigate the occurrence and reporting of medication errors by nurses in hospitals affiliated with Mashhad University of Medical Sciences, Mashhad, Iran.</p> <p><b>Materials and Methods:</b> This descriptive cross-sectional study was conducted on 530 nurses selected by simple and stratified random sampling in 2014. Data were collected using a survey consisting of four sections and 66 questions, scored based on a Likert scale (87% return rate). Data analysis was performed in SPSS Version 18 using descriptive statistics, ANOVA test, and chi-square test. P-value of less than 0.05 was considered statistically significance.</p> <p><b>Results:</b> The most prevalent medication errors by nurses was early or late administration of medication (43.7%), which was attributed to individual factors by the managers in the viewpoint of the nurses (mean: 3.66+1.3). In addition, the occurrence of medication error might be due to the hospital ward patient overcrowding (4.29+1.07). No significant relationship was observed between the variables of medication error, the causes, and lack of error report with gender and nursing experience (P=0.6 and P=0.8, respectively).</p> <p><b>Conclusion:</b> One of the effective methods for prevention of medication error is providing teaching courses for nurses to raise their knowledge in this regard and aware them of the outcomes of wrong medication prescription.</p>

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### Introduction

It has been known to human kind that error is an inevitable part of life (1). Medication errors are among the recognized challenges in the hospitals (2), which could endanger patient safety (3). These types of errors lead to patient dissatisfaction regarding medical services (4) due to their significant adverse outcomes (5). Therefore, given the prevalence and possible harms of medication errors for patients, and since these errors are preventable, they account for an important part of medical errors (6). In addition, medication error is a major problem in inpatient hospital care causing damage to patients (7).

The National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) defines

the report and prevention of medication errors as: “any preventable incidence which might result in inappropriate medication use or patient harm while the medication is under the control of the healthcare professionals, patients, or consumers” (8).

Medication errors are potentially generated by the construction, distribution, and consumption of medication, as well as the monitoring of possible side effects of medications (9). One of the most important challenges regarding medication safety improvement is lack of medication error reporting (10), which could be a threat to nursing care quality (11).

According to The National Patient Safety Agency (NPSA), medication errors occur in all care settings in

the United Kingdom, with 16%, 18%, and 50% in medication administration, distribution, and use, respectively (12). According to the literature, approximately 65-87% of medication errors appear in medication prescription and consumption processes (13). Therefore, nurses are obligated to follow the principles of medication prescription (e.g., right medication, dose, and procedure, as well as proper timing) in order to improve medication administration and minimize errors and mistakes (14).

In developing countries, hospitals encounter various challenges, such as improper resource management, low-quality performance, healthcare services provided by unprofessional personnel, flexible bureaucratic structure, and inappropriate fee-for-service payment. These challenges are considered as major obstacles to the improvement of healthcare quality (15).

According to previous studies, people might experience distinct feelings in such situations, the most prevalent of which were feelings of guilt, fear, concerns regarding adverse patient outcomes, low self-esteem, as well as fear of punishment and dealing with the judgment of others (16). Evidence suggests that patient safety could be improved through the creation of a non-punitive culture, which contributed to the promotion of medication error reporting (17). In addition, the provision of necessary conditions for improving the quality of services by hospital administrators, in collaboration with the medical staff, could enhance patient satisfaction (18).

Mashhad University of Medical Sciences is one of the state universities, affiliated with the Ministry of Health and Medical Education in Mashhad city, Iran.

This university currently consists of seven deputies, 18 healthcare networks, eight schools, 28 hospitals, and 16 research centers, (four approved by the Ministry of Health and 12 by the university). In addition, this university provides a wide range of healthcare services (covering more than five million people) and is considered as the biggest university of Iran. Given the importance nursing error reporting, this study was conducted to evaluate the occurrence and reporting of medication errors by nurses in hospitals affiliated with Mashhad University of Medical Sciences in Mashhad.

## Materials and Methods

This descriptive cross-sectional study was conducted on 530 nurses working in various wards of teaching hospitals (e.g., Omid, Shariati, Kamyab, Hejazi, Ibn-sina, Dr.sheikh, Ghaem, Ommul-banin, Khatam-al-anbiya, HashemiNezhad, Montaserie, Imam Reza, and Taleghani), affiliated with Mashhad University of Medical Sciences in 2014. Samples were selected using simple and stratified random sampling. In this study, medical error survey was used as data collection tool. This survey has been designed based on literature review and its validity was confirmed by content validity through interviews with 10 experts. Reliability

was confirmed through the completion of 20 questionnaires by the participants (Cronbach's alpha: 0.92). The medical error survey consisted of four sections as follows: 1) demographic characteristics (seven items), 2) errors occurred by nurses and the following formal and informal reporting of medication errors (19 items); frequency of these errors was determined with four options of never, once, twice, and more than twice within a score range of 1-4, 3) causes of inadequate medication error reporting (14 items), and 4) causes of nursing medication errors (26 items).

It should be noted that the last two sections were scored based on a five-point Likert scale. At first, the objectives of the study were explained to the participants and they were assured of confidentiality terms. Afterwards, written informed consents were obtained from the samples and medical error survey was distributed to the participants. In total, 530 surveys were distributed, 462 of which were returned to the researcher (response rate: 87.1%). Data analysis was performed in SPSS version 18 using mean central tendency (frequency, percentage, mean and standard deviation), ANOVA test, and chi-square test. P-value of less than 0.5 was considered statistically significant.

This study was approved by the deputy of Mashhad University of Medical Sciences. At first, the purpose of this study was described for nurses. After obtaining their informed consent to participate in research, the questionnaire was delivered to the nurses and all the information about them was remained confidential to the researcher.

## Results

In total, 18.6% of the samples were male, 79.9% were female, and 1.5% did not disclose their gender. In terms of marital status, 21.8% of the subjects were single and 78.2% were married. With regard to employment status, the participants were either permanent, contractual, or commissioned employees; however, contractual employees were the major part of the participants (44%) (Table1).

**Table 1: Demographic characteristics of the study population**

		Abundance Percentage	
Sex	Male	86	18.6
	Female	368	79.9
	No reply	7	1.5
Marital Status	Single	98	21.8
	Married	352	78.2
Type of working shifts	Fixed	118	28.6
	Circulating	295	71.4
Employment Status	Formal	79	18.3
	Contractual	191	44.2
	Mandatory practice	70	16.2
	Permanently employed	92	21.3
Nursing experience	Less than 10 years	313	72.8
	10-20 years	83	19.3
	More than 20 years	34	7.9
Average age	32.7±6.9		

The four most frequent nursing errors in order of significance were: 1) early or late medication administration (43.7%), 2) medication administration without a physician's order (36.8%), and 3) negligence of proper timing for medication administration (e.g., after or before each meal) (32.9%). No significant relationship was observed between the medication errors and variables of gender and nursing experience ( $P > .05$  and  $P = 0.6$ , respectively). The fourth error was identified as injection of medication and its pace (37.3%), which had a significant relationship with gender of the samples ( $P = 0.04$ ). However, this error had no significant relationship with nursing experience of the subjects ( $P = 0.8$ ) (Table 2).

**Table 2: Frequency of medication error reporting by nurses**

Medication errors	Frequency of the occurrence of medication errors								The number of formal medication error reports								The number of informal medication error reports							
	Never		Once		Twice		More than twice		Never		Once		Twice		More than twice		Never		Once		Twice		More than twice	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
1. Early or late medication administration	245	56.3	42	9.7	41	9.4	107	24.6	412	94.3	13	3	3	0.7	9	2.1	387	88.2	13	3	9	2.1	30	6.8
2. Medication administration without a physician's order	282	63.2	47	10.5	27	6.1	90	20.2	403	92.2	14	3.2	10	2.3	10	2.3	380	87.2	17	3.9	5	1.1	34	7.8
3. Negligence of proper timing for medication administration (e.g., before or after each meal)	292	67.1	53	12.2	33	7.6	57	13.1	419	95.4	10	2.3	4	0.9	6	1.4	400	91.7	11	2.5	1	0.2	24	5.5
4. Injection and its pace	297	67.2	60	13.6	40	9	45	10.2	418	95.9	12	2.8	3	0.7	3	0.7	389	89.2	29	6.7	10	2.3	8	1.8

According to the viewpoints of nurses, the most important causes of inadequate medication error reporting were individual blame rather than considering organizational function (mean: 3.66+1.3), nurses' fear of medical lawsuits (mean: 3.63+1.4), and fear of disclosure of healthcare errors due to professional repercussions (mean: 3.45+1.5). According to the results, no significant relationship was observed between these factors and variables of gender and nursing experience ( $P = 0.7$  and  $P = 0.9$ , respectively).

The most important reasons for incompetent error reporting expressed by nurses were as follows:

- 1- Hospital ward patient overcrowding (mean: 4.29+1.07)
- 2- Heavy workload and nursing duties (mean: 4.23+1.09)
- 3- Patients with urgent conditions in the ward (mean: 4.03+1.21)
- 4- Inadequate nurse staffing (mean: 3.95+1.4)
- 5- Incomprehensible prescriptions by physicians (mean: 3.87+1.25)

The results were indicative of no significant relationship between the mentioned reasons and gender and nursing experience of the participants.

## Discussion

The current study was conducted to investigate the occurrence and reporting of medication errors by

nurses in hospitals affiliated with Mashhad University of Medical Sciences. According to the findings of this study, early or late medication administration was the most frequent medication error by nurses (43.7%).

This denotes that part of the treatment procedure is not performed in accordance with the physician order.

However, in a study by Josikélem da Silva Sodré Pellicciotti, most of the errors were related to medication prescription, dose, and timing (8). In this regard, "wrong medication dose" was the most frequent medication error observed in a study in Arak University of Medical Sciences, Arak, Iran (22.03) (19), as well as another study by Zayed Alsulami (12).

According to the results obtained by Mohammad Al-Shara, wrong-patient medication error was the most frequent nursing error in hospitals (26.2%) (13). Type of medication errors are different due to the specific duties of each nurse. It is recommended that teaching courses be conducted to raise the knowledge of nurses and minimize nursing medication errors.

According to the viewpoints of nurses, the most significant cause of medication errors was hospital ward patient overcrowding (mean: 4.29+1.04), distracting the nurses and resulting in medication errors. In a study by Mohammad al-Shara, the highest mean of medication error occurrence was associated with heavy workload (41.4%) (13). A study in Ahvaz University of Medical Sciences, Ahvaz, Iran,

demonstrated that work fatigue (83.1%) was the most important reason for medication error (20). In a similar study in Golestan University of Medical Sciences, Golestan, Iran, lack of nursing experience was the most significant cause of medication errors (21).

On the other hand, the results obtained by Seyyedeh Roghayeh Ehsani indicated that using abbreviated drug names was the most significant cause of medication error (48.93%) (22). Since heavy workload and work fatigue of nurses were regarded as the most important reasons of medication errors in the majority of studies, proper planning and improved human resources might prevent the occurrence of medication errors to some extent. In the current study, the most significant cause of inadequate error reporting was individual blame rather than considering organizational function (mean: 3.66±1.3), which could result in less frequent error reporting by nurses. In a study by Bahadori, administrative factors were the most significant cause of inadequate error reporting (mean: 3.56± 0.99) (3).

In the mentioned study, managers had a higher tendency towards individual blame rather than considering organizational function. Similar results were also obtained in a study in Ahvaz University of Medical Sciences (4.12±0.76) (23). In one study conducted in the hospitals of Khorramabad, Iran, fear of punishment (88.4%) was the main cause of medication errors (24), while nurses' fear of medical lawsuits was the major cause of inadequate reporting in a research in Lorestan University of Medical Sciences, Lorestan, Iran (81.6%) (25).

It could be concluded that changing the administrative viewpoint of hospital managers from individual blame to considering organizational function can improve reporting of the medication errors. Hospital managers can encourage nurses to report any sort of problems or errors and prevent its recurrence through the creation of a proper environment in the hospitals. Major drawbacks of this study were lack of honesty in completing the survey due to fear of punishment by the administrators and organization, as well as lack of trust in the researcher.

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## Strength points

This study included all the departments of the hospitals, affiliated with Mashhad University of Medical Sciences, which allowed the relevant managers to reduce or eliminate the causes of medication errors, enhance patient safety, and improve service quality.

## Conclusion

According to the results, the leading causes of medication error were early or late medication administration, heavy workload, and inadequate nurse staffing. However, they could be prevented through proper planning, sufficient employment of human resources, and proper distribution of nurses among various hospital wards. Hospital ward patient overcrowding was the most important cause of medication errors in the present study. Given the undeniable effect of working conditions on medication errors, it is suggested that the general knowledge of nursing officials be raised in this regard to prevent medication errors. According to our findings, the most significant reason for inadequate error reporting was individual blame rather than considering organizational function. Therefore, a clear guideline could be designed to help nurses recognize what to report, how, and to whom. Medication errors could be prevented by providing a judgment-free environment, ensuring nurses of legal immunity, and, most importantly, rewarding proper medication error reporting.

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