

## Barriers of Medication Administration Error Reporting in Neonatal and Neonatal Intensive Care Units

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ARTICLE INFO	ABSTRACT
<p><b>Article type:</b> Original Article</p> <hr/> <p><b>Article History:</b> Received: 24-Jun-2020 Accepted: 24-Sep-2020</p> <hr/> <p><b>Key words:</b> Medication administration error, Neonatal and Neonatal Intensive Care Units, Nurses.</p>	<p><b>Introduction:</b> Medication administration error is the most common type of error in the field of medicine which is a risk factor for neonatal safety. These errors should be reported in order to prevent or mitigate their occurrence. In this regard, the present study aimed to determine the barriers of reporting medication administration errors from the point of view of nurses in neonatal and neonatal intensive care units.</p> <p><b>Materials and Methods:</b> This descriptive cross-sectional study was performed on 157 nurses who were selected using the census sampling method. The participants were nurses of neonatal and neonatal intensive care units in the hospitals affiliated to Shahid Beheshti University of Medical Sciences in Tehran, Iran. Moreover, the required data were collected using the second part of the Medication Administration Error Reporting Survey whose psychometric properties (content validity, face validity, construct validity, and reliability) were determined beforehand.</p> <p><b>Results:</b> Results of factor analysis indicated the fitness of the data of the Persian version of the scale with 16 items and four factors. Based on the findings, from the point of view of nurses, "fear" and "administrative response" were the most important barriers to reporting errors, in that order. The most and least common fears of nurses were the fear of negative perceptions and complaints of the family of patients (4.95±1.28) and the fear of reprimand by physicians (3.22±1.43), respectively. Moreover, the most important barrier in reporting the errors concerning the administrative response was the lack of positive feedback regarding the correct medication administration (4.22±1.62).</p> <p><b>Conclusion:</b> According to the results, it can be concluded that from the viewpoint of nurses, fear and administrative response are barriers to reporting medication administration errors.</p>
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## Introduction

Medication administration error, as a threatening factor for the patient, is defined as a harmful and preventable event, which occurs in the process of drug preparation and medication. It is associated with improper use of the drug, wrong dose, as well as incorrect use of oral and injectable drugs (1). In pediatric care units, the rate of medication administration errors have been reported high (62.8%) (2), and there is a similar experience in the medication error type in the neonates; however, this process is very intricate and increases the damage to the infant in the event of an error (1).

Neonatal units and neonatal intensive care units (NICUs) are potentially talented in the occurrence of medication errors because of the high sensitivity and hospitalization of the ill and vulnerable neonates. As many as 78% of the infants, at least one or more, experience medication errors during the hospital stay (3). The key factors that make neonates more vulnerable to medication errors include the widespread exposure of drugs, lack of special drug compounds for infants, and long-term hospitalizations (4). The prevalence of medication errors in the NICUs is 8 times higher than that in adults. In general, medication administration errors account for 84.2% of the medical errors in the NICUs (5).

The management of the medication process, which is intricate, multifaceted, and time-consuming, is a nursing task and responsible for more than 40% of the nurses' activity (6). Two-thirds of the medication errors are made by the nurses (1), and 37.8% of them reported that they had committed 1-2 medication errors; moreover, 13.4% of the nurses had 9-11 errors within the last 6 months (7).

Medication errors are of critical importance, the prevention of which plays a remarkable role in improving patient safety since a high proportion of them leads to harmful consequences for the patient (8). The first step in preventing medication errors is reporting (9). "Medication Error Reporting" provides the feasibility of error analysis, and subsequently, reduces error consequences, pathogenicity, and mortality. It also promotes the internal development of the

caring system and improves patient safety. Nonetheless, about 60% of the medication administration errors are not reported (10). The results of a study showed that 47% of the participants were unsuccessful in the medication administration error reporting (11). Similarly, another study estimated the mean medication administration errors in nurses at 19.5 during 3 months; however, only 1.33 were reported by nurses (12).

Nurses' failure to report errors is influenced by various personal and organizational components. Furthermore, the specific condition of the clinical units can be effective in reporting the errors. The results of studies on the viewpoint of nurses about the barriers to error reporting are various (12); however, there is a little evidence in infants in this regard (1).

Since the understanding of the nurses' perspectives about the barriers of the medication error reporting is the first step in promoting medication safety (13), this study aimed to determine the barriers of medication administration errors from the nurses' perspectives in neonatal units and NICUs.

## Materials and Methods

This descriptive cross-sectional study was conducted to determine the barriers of medication administration errors from the nurses' perspectives in Iran. This study included 157 nurses working at neonatal units and NICUs of Mahdiyeh, Mofid, Imam Hossein, Shohada, and Taleqani hospitals affiliated to Shahid Beheshti University of Medical Sciences, Tehran, Iran. All nurses who had at least a bachelor of science degree, physical and psychological health (according to their reports and medical records), different employment status, one-year working experience in these units, and those who were not nursing managers (matron and supervisor) were included in this study. The second part of "Medication Administration Error Reporting Survey" (10) entitled "why medication administration errors are not reported" was used after determining the psychometric properties (content validity, face validity, construct validity, and reliability) in the nurses of neonatal units and NICUs. This part consists of 15 items with four subscales,

including "Disagree with definition" (n=4), "Reporting effort" (n=2), "Fear" (n=5), and "Administrative response" (n=4) (10). Moreover, ten questions were devoted to the demographic characteristics, and the items were rated on a six-point Likert scale from 1=strongly disagree to 6=strongly agree. The obtained score in each item and sub-scale (Standard mean: Total item scores divided by the number of items in each sub-scale) closer to 6 indicates the greater effect of that factor in failing the error reporting based on the nurse's perspective (10). The reliability of the original version of the tool was examined during four continuous years (1994, 1996, 1998, and 2001) which reflected the Cronbach's alpha of 0.69-0.85 in the section of "why medication administration errors are not reported". Another study also reported a Pearson correlation and Cronbach's alpha of 0.53-0.78 and 0.62-0.92, respectively (10). This tool has been translated and used with accepted validity and reliability in several countries, such as Saudi Arabia, South Korea, Egypt, and Slovenia (6,14-16).

Initially, the written permission for the utilization of the tool was obtained from the designer based on the "World Health Organization Translation and Cultural Adaptation Guidelines". In the next step, the "why medication administration errors are not reported" section was translated into Persian by two fluent translators. Following that, the final Persian version of the tool was translated into English by two other translators who had no information about the English version of the tool and research

procedures. A copy of the final English version of the scale was sent to the tool designer to be confirmed. Eventually, it was approved by the designer after some minor corrections and revisions; accordingly, the Persian version was utilized for psychometric analysis. In order to determine the quantitative content validity, 17 members of the scientific community were selected purposefully to evaluate the Persian version of the tool in terms of relativity. These experts included children and neonatal nursing managers (n=5), neonatologists (n=3), pharmacists (n=5), and experts in the tool design (n=4). In the next step, the percentage of the content validity index for all the items was calculated based on the four-point Likert scale (S-CVI=0.91 and I-CVI=0.77-0.100) which indicates its acceptability (17). Qualitative content validity was also confirmed based on the opinions of the experts.

In total, 15 nurses working in neonatal units and NICUs were purposefully selected based on their work experience and requested to determine the face validity of the scale. It is worth mentioning that the necessary changes were made after their comments. Regarding the internal consistency, the Cronbach's alpha of the total scale was  $\alpha=0.86$ , and the corresponding value of the four sub-scales was between 0.62 and 0.84. Furthermore, the tool stability was determined by measuring the Inter Class Correlation using test-retest (14-day interval) with excluding 15 participants from the study (Table 1).

**Table 1:** Test-retest reliability of the second part of Medication Administration Error Reporting Survey (Why medication administration errors are not reported?)

The second part of the tool	ICC	95% Confidence Interval		P-value
		Lower Bound	Upper Bound	
Why medication administration errors are not reported	0.995	0.984	0.998	P<0.001

This study was approved by the Research Deputy of Shahid Beheshti University of Medical Sciences, Tehran, Iran (IR.SBMU.PHNM1395.437). After obtaining the required permission, the researcher was presented in each ward and provided the participants with necessary explanations about the research objectives and

procedures. It should be noted that informed consent was obtained from all participants. Subsequently, the questionnaires were given to the participants in closed envelopes, and they were requested to complete them. The data were collected from September 2017 to February 2018. In total, 166 nurses completed the questionnaires and 9

questionnaires were removed from the study due to incompleteness. The obtained data from 157 completed questionnaires were analyzed using EQS software (Version 6.1) and SPSS software (Version 20). A p-value less than 0.05 was considered statistically significant. Since the questionnaire was already designed, construct validity was performed by

confirmatory factor analysis.

**Results**

The mean age of the participants was 33.5±6.39 years, and the mean work experience was obtained at 6.08±0.64 years; moreover, the mean work experience of the nurses in neonatal units and NICUs was estimated at 7.32±5.80 years (Table 2).

**Table 2:** Distribution of demographic characteristics of nurses participating in the study

Variables	Items	Frequency (%)	Variables	Items	Frequency (%)
Gender	Male	5 (3.2)	Shift type	Fixed	31 (19.7)
	Female	152 (96.8)		Rotation	126 (80.3)
Marital status	Single	54 (34.4)	Education level	Bachelor	142 (90.4)
	Married	99 (63.1)		Masters	15 (9.6)
	Divorced	3 (1.9)		Doctorate	0
	Other	1 (0.6)			
Employment status	Rasmi*	93 (59.2)	Position	Nurse	147 (93.6)
	Gharardad**	47 (30)		Head nurse	10 (6.4)
	Tarhi***	17 (10.8)			
Care method	Case Method	157 (100)	Employment at anywhere else	Yes	28 (17.8)
	Teamwork	0		No	129 (82.2)

\* Permanent Employment \*\* Contract Employment \*\*\* Who undertakes

Table 3 tabulates the obtained fit results from the confirmatory factor analysis and goodness of fit index (GFI), comparative fit index (CFI), incremental fit index (IFI), root mean square error of approximation (RMSEA), non-normed fit index (NNFI), and adjusted goodness of fit index (AGFI).

Although the GFI and AGFI were less than 0.9 and show no acceptable fitness, other goodness of fit indices, such as CFI, NFI, RMSEA, IFI, SRMR, and NNFI reveal acceptable fitness with the "why medication administration errors are not reported" (15 items and 4 sub-scales).

**Table 3:** Results of confirmatory factor analysis approval for the Persian version of the section "Why medication administration errors are not reported" in Medication Administration Error Reporting Survey"

Model	X <sup>2</sup>	DF	X <sup>2</sup> /df	MFI	CFI	GFI	IFI	RMSEA 90%	NNFI	AGFI
Why medication administration errors are not reported	122.870	98	1.254	0.901	0.971	0.833	0.972	0.04	0.965	0.769

The total score for the "why medication administration errors are not reported" and its sub-scales were determined in this study. The Chi-square test was employed to prove the equivalence hypothesis of the importance of the items (X<sup>2</sup>=538.996, df=14, P=0.000). In total, two factors of "Fear" and "Administrative response" were the major barriers to error reporting in descending

order. Moreover, the patient or family's negative attitude toward the nurse (mean score=4.95) in "Fear" and no positive feedback giving for passing medications correctly (mean score=4.82) in "Administrative response" were more important. Table 4 summarizes the results in this regard (Table 4).

**Table 4:** Mean±SD of items and sub-scales of "Why medication administration errors are not reported" from the viewpoint of nurses participating in the study

Items and subscales	M (SD)* Subscale	M (SD)**	*** Interpretation	Sequence
<b>1.Reporting effort</b>	(0.80) 2.58		Moderate disagree	
Filling out an incident report for a medication error takes too much time.		(1.44) 3.08	Slightly disagree	11
Contacting the physician about a medication error takes too much time.		(1.02) 2.62	Moderate disagree	13
<b>2.Disagree with definition</b>	(0.61) 3.10		Slightly disagree	
Nurses do not recognize an error occurred.		(1.88) 2.65	Slightly disagree	12
Nurses do not agree with hospital's definition of a medication error.		(1.39) 2.41	Moderate disagree	15
Medication error is not clearly defined.		(1.20) 3.95	Slightly agree	8
Nurses may not think the error is important enough to be reported.		(1.11) 3.40	Slightly disagree	9
<b>3.Fear</b>	(0.59) 4.41		Moderate agree	
Nurses believe that other nurses will think they are incompetent if they make <b>errors</b>		(1.26) 4.55	Moderate agree	5
The patient or family might develop a negative attitude toward the nurse, or may sue the nurse if a medication error is reported.		(1.28) 4.95	Moderate agree	1
Nurses are afraid the physician will reprimand them for the medication error.		(1.43) 3.22	Slightly disagree	10
Nurses are afraid of the adverse consequences from reporting medication errors.		(1.44) 4.76	Moderate agree	3
Nurses could be blamed if something happens to the patient as a result of the medication error.		(1.30) 4.59	Moderate agree	4
<b>4.Administrative response</b>	(0.44) 3.87		Slightly agree	
No positive feedback is given for passing medications correctly.		(1.56) 4.82	Moderate agree	2
Too much emphasis is placed on medication errors as a measure of the quality of nursing care provided.		(1.12) 4.09	Slightly agree	6
When medication errors occur, nursing administration focuses on the individual rather than looking at the systems as a potential cause of the error.		(1.01)3.97	Slightly agree	7
The response by nursing administration does not match the severity of the error.		(1.88) 2.60	Moderate disagree	14

\*Standard mean: Total item scores divided by the number of items in each sub-scale \*\* The mean score of each item

\*\*\* Interpretation: Strongly disagree (1-1.80), Moderate disagree (1.81-2.64), Slightly disagree (2.65-3.48), Slightly agree (3.49-4.32), Moderate agree (4.33-5.16), Strongly agree (5.17-6) (6).

There was no significant difference between the mean score of "Fear" sub-scale with demographic information (gender, position, employment at anywhere else, education level, marital status, care method, and employment status) ( $P > 0.05$ ). Pearson correlation coefficient between "Fear" sub-scale and variables such as age, total work

experience, as well as work experience in neonatal units and NICUs were  $r = 0.039$ ,  $P = 0.629$ ;  $r = 0.038$ ,  $P = 0.640$ ; and  $r = 0.023$ ,  $P = 0.776$ , respectively. This indicates no significant linear relationship in this regard. Furthermore, there was no significant relationship between nurses' demographic characteristics and three other subscales

( $P > 0.05$ ). Moreover, independent t-test showed that nurses with a master's degree believed more firmly that the failure to

## Discussion

This study was conducted to validate the aspect of "why medication administration errors are not reported" in the Medication Administration Error Reporting Survey (10) and determine the causes of the failure to report errors. The results revealed that the Persian version of this aspect of the tool had acceptable validity and its construct factor was consistent with that of the original version of the questionnaire. During translation and back translation, several items of the questionnaire were changed (18). Despite the fact the content validity index (CVI) of the "medication error is not clearly defined" was 0.77, the total CVI was acceptable. Moreover, the confirmatory factor analysis confirmed four subscales and 15 items in the Persian version of the questionnaire in the neonatal units and NICU nurses. Wakefield et al. (2005) performed a confirmatory factor analysis and introduced a four-factor model (10). The Cronbach's alpha was obtained at 0.76, and the highest (0.84) and lowest (0.62) Cronbach's alphas were obtained for "fear" and "reporting effort" subscales, respectively. Furthermore, the reliability of this dimension has been reported as acceptable (10). In addition, the results of the test-retest indicated the acceptable reliability of this aspect (0.995). According to the results of the present study, the most important barrier to error reporting was fear and this is consistent with the findings of a previous study which revealed that "fear" with a mean value of  $3.18 \pm 0.48$  was the main obstacle to reporting the errors (19). Fear of the consequences of error reporting and loss of occupation were known as key components, in that order (16). In fact, the root cause of the failure to report errors was the fear of negative reactions and legal consequences (20). Based on the results of another study (21), due to the fear of punishment, only 28.6% out of 62.6% of the errors were reported. On the other hand, 88.9% of the medication administration errors were reported informally and often verbally to the head nurses (19). It seems that the nurse's

report error was related to "disagree with the definition", compared to those who had a bachelor's degree ( $P = 0.02$ ).

fear of consequences can affect the reports (22) and can also be considered as the main cause of informal reporting. In fact, by informal reporting, nurses try to both improve the safety level of the patients and also protect themselves from the threatening consequences. However, the lack of formal reporting limits the opportunities for improving the safety level of the patients (23). The complex environment of the NICU is filled with stress and various equipment. Therefore, it is necessary to carry out documented reports of medication errors to identify the safety threats of neonates and promote the safety level of the process of medication administration and system modification.

Based on the results of a study performed in Saudi Arabia (2013), the most important factor that prevented error reporting was "Administrative response" which is inconsistent with the findings of the present study (6). However, the above-mentioned study was conducted only in a state hospital; therefore, the results should be generalized carefully. Moreover, this barrier was the second common factor in the present study. This inconsistency could be attributed to differences in the nationality, culture, context, and work environment of the nurses. Culture is one of the most important factors affecting medication administration error reporting (13) since nurses with different cultures have different beliefs about errors. Furthermore, cultural and organizational differences affecting the hospital are also involved in this issue. Results of this study revealed that fear was mostly due to the negative attitude of the patients and families and the threat of being sued, while the fear of administrative reprimand obtained the lowest score. This finding is not in line with the findings of some studies which have suggested that the reason for the fears of nurses was being reprimanded by doctors or being blamed (16,24). However, some other studies have indicated that the fear of the negative attitude of the patients and their families towards the nurse is an important factor that is consistent with the results of the present study (25). Nevertheless, based on ethical

principles, patients and their families have the right to be informed of the mistakes (26); moreover, if they are honestly involved in the event of an error, they will be less likely to sue (27).

Another study has shown that in the pediatric care units, only 7.1% of mistakes are reported to the patients and their families (28). It is necessary to amend the error reporting system in order to have nurses actively and enthusiastically report the error in a completely confidential manner (19). In addition, reprimand must be removed from the culture of the workplace. Fear is the most important barrier in medication administration error reporting among nurses in different countries which has various forms in different societies and cultures (19). Nevertheless, as long as there is no non-punitive environment, no one reports the errors; consequently, the error occurs repeatedly. In other words, nurses who feel more responsible were more likely to be afraid of the consequences of error reporting and its reprimand. This factor can gradually affect the ability and quality of nursing care. Therefore, it is necessary to use counseling classes to reduce the fears in nurses of neonatal units and NICUs and promote their sense of security.

In this study, the second barrier to medication administration error was "administrative and affairs responses" which indicated the obstacles related to the attitudes of administrators. The researchers who conducted a study on 253 nurses also reached similar findings (13). Moreover, in another study, the administrator response and lack of encouragement by managers was reported as the most important barrier to error reporting (29).

"No positive feedback for passing medications correctly", was the main obstacle to reporting the error in the "administrative response" sub-scale from viewpoint of nurses. This finding is important since it shows that hospitals need to emphasize the promotion of organizational processes to provide positive feedback regarding the efforts of nurses. However, this is inconsistent with the results of another study which indicated that the lack of positive feedback was less important (30). None of the demographic

characteristics of nurses had a significant relationship with fear which shows that fear is the first barrier to medication administration error reporting from the viewpoint of nurses in neonatal units and NICUs, regardless of any individual and organizational characteristics.

The third barrier to medication administration error reporting from the viewpoint of nurses was the "disagreement with the definition". However, in another study, this factor was the most important factor and the first barrier in error reporting (22). This finding shows that the successful implementation of the correct error reporting system depends on the ability of the nurses to recognize the error and their belief in reporting it. Therefore, after being ensured of the ability of nurses to recognize the error and with regard to the factors of fear and administrative response, positive changes can be made in the error reporting system in the neonatal units and NICUs. It seems that enhancement of the knowledge of nurses about medication errors and the provision of a clear definition of it can improve error reporting status.

## Conclusion

Based on the results, the two factors of "fear" and "administrative response" were the main barriers to the failure of medication error reporting among nurses in neonatal units and NICUs. Moreover, it was found that the negative attitude of patients or their families and the threat of being sued were the most common causes of fear in nurses. Furthermore, it can be concluded that if nurses receive positive feedback from the managers for the correct medication administration, the error reporting status and safety of the patients will be improved.

## Limitations

This study had some limitations that should be considered when interpreting its results. The self-report questionnaire could have influenced the results of this study considering the impact of the individual and environmental factors of the participants when completing the questionnaire. Moreover, the present study did not address the range and factors affecting the occurrence of medication administration

errors in NICUs (7) which were mentioned in a previous study in 2013. This can be considered as another limitation as well.

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