

The Effect of Motivational System on the Reporting Rate of Medication Errors in Iranian Pediatric Wards

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Abstract

Background: The rate of reporting medication errors among nurses is lower than the actual rate. The role of education, encouragement, and promotion of reporting culture can contribute to the increase of errors reporting. This study was to investigate the effect of motivational system on reporting of medication errors in pediatric wards

Methods: A quasi-experimental study was done through 60 nurses working in pediatric wards of the selected hospital were selected using census sampling method. Data were collected using a questionnaire based on eight medication principles completed by the nurses before and after the intervention. The intervention in this study was a motivational program with two parts of training and positive reinforcement that was conducted in 2018 for four months. For data analysis, SPSS16 was used.

Results: After the intervention, the most prevalent medication error (60%) was in the principle of right medication (related to similar name. Furthermore, the mean score of nurses' medication error reporting increased significantly in all the principles after the intervention ($P < 0.05$).

Conclusions: Motivational system increased reporting of medication errors in nurses. Therefore, the managers can improve medication care and the children safety through continuous training and encouragement in the hospitals.

Background

Children are the most vulnerable group of patients in hospitals and medical centers. Therefore, more safety issues should be considered in their hospitalization for treatment and care. In the crowded and stressful environment of the children's wards, errors, especially medication errors, occur frequently. For this reason, pediatric ward nurses need to have sufficient knowledge and skills for managing medical care (1).

Decision-making during the occurrence of medication errors is a complicated process and may lead to behaviors such as hiding the errors. The first step in preventing medication error is the appropriate understanding of the factors that cause the error. Error reporting is an important step in preventing it from recurrence and a valuable source of information as well (2).

According to the studies, the rate of reporting errors among nurses is lower than the actual rate (3, 4). Ghorbanpour Diz et al. (2016) in a study conducted in Tehran hospitals showed that out of 112 nurses who had medication errors over the last year, only 28% had reported their errors (2). Similarly, in the study of Aboshaiqah (2013) at public hospitals in Saudi Arabia, 79% of participating nurses believed that medication errors were less reported (5).

It seems that designing a system that increases the reporting of medication errors by nurses can prevent the repetition of similar errors and their destructive consequences. To design a system or program, there are various kinds of approaches one of which is motivating through using techniques such as rewarding and positive reinforcement that can desirably influence the enhancement of behavior (6). Motivation is a

requirement for nurses' progress and motivated nurses have a better performance (7). Therefore, it is necessary to pay more attention to the motivation of nurses in order to improve this behavior in them (8).

Accordingly, in order to lessen medication errors and their various consequences and increase reporting of errors, the researchers designed a motivational system and evaluated the effect of this system on the rate of medication error reporting in the pediatric wards of the selected hospital affiliated to Isfahan University of Medical Sciences in 2018.

Methods And Design

This quasi-experimental study was conducted with pre- and post-test design and investigated the effect of motivational system on medication errors reporting of nurses working in pediatric wards. After obtaining the permission of the vice chancellor for research and technology of Isfahan University of Medical Sciences, the researcher referred to the selected hospital and, after introducing herself and outlining the aims and process of the study, invited all of the nurses working in the three internal wards of the hospital who met the inclusion criteria to participate in the study. Census sampling method was performed with 60 nurses. Data collection tool was a two-part researcher-made questionnaire: 1) Demographic information; 2) Medication error reporting questionnaire based on eight medication administration principles. Content validity and test-retest method were used to test the questionnaire's scientific validity and reliability respectively, and its reliability was confirmed with the coefficient of 0.87. Cronbach's alpha was also employed to verify the internal consistency of the questionnaire that was calculated to be 0.8.

The intervention of this study involved designing a two-part motivational system. The first part was a training program consisted of two sessions on medication errors based on eight medication administration principles (right medication, right dose, right route, right patient, right reason, right time, right recording, and right response), the necessity and importance of medication errors reporting, etc. The second part was the motivational system planning which was done in collaboration with the head, the director of nursing and the hospital authorities. The program provided a condition to encourage (positive reinforcement and reward) the pediatric wards with the highest rate of errors reporting,

The method of the research was such that the questionnaires were first distributed among all nurses in the three wards of the hospital and they were informed about the objectives of the research and, then, the intervention was performed for three months during the autumn season. Then, the questionnaires were recompleted in the form of post-test by the subjects of the research. In collaboration with the hospital safety unit, the accuracy of the submitted reports was verified. Finally, the effect of the motivational system was measured based on the eight principles of medication administration by comparing the mean scores of the research subjects obtained from medication errors reporting before and after the intervention. After the intervention, the personnel and the wards that were active in medication errors reporting were appreciated according to the motivational system.

Data were analyzed using descriptive (frequency distribution and mean) and analytical (Wilcoxon test and paired t-test) statistics. SPSS16 was used for data analysis in this study.

For ethical considerations and confidentiality of the information, the questionnaires were used anonymously. The consent of the nurses was obtained and the project (code of ethics: 1397.338) was approved by the Ethics Committee of Isfahan University of Medical Sciences.

Results

Demographic characteristics of the nurses working in pediatric wards of the selected hospital affiliated to Isfahan University of Medical Sciences are shown in Table 1. The mean age of nurses was 31.43 years with maximum of 24 years of working experience. Most of the nurses were married (56.7%) with bachelor's degree (93.3%) and rotational shiftwork (88.3%). The participating nurses reported that in the past three months before the intervention, the rate of the medication errors they committed or witnessed being done by a colleague has been 86.7%, and that they had reported 75% of the errors.

Table 1
Demographic characteristics of the research subjects

Variable		Mean (SD)	No. (%)
Age (year)		31.43 (7.44)	-
Nursing work experience (years)		7.20 (6.21)	-
Work experience in the current ward (years)		3.18 (2.46)	-
Marital status	Single	-	26 (43.3)
	Married	-	34 (56.7)
Education	Bachelor	-	56 (93.3)
	Master	-	4 (6.7)
Working shift	Rotational	-	53 (88.3)
	Fixed	-	7 (11.7)
Employment type	Permanent employment	-	24 (40)
	Contractual	-	10 (16.7)
	Internship	-	23 (38.3)
	Labor recruitment	-	3 (5)
Passing a Pharmacy Career Training course		-	30 (50)
Committing a medication error (oneself or a colleague)		-	52 (86.7)
Medication error reporting		-	45 (75)

The results of the Wilcoxon test showed that the rate of medication errors reporting was significantly increased in most of the principles after the intervention compared to before the intervention ($P < 0.05$). With regard to the right medication, the most frequent errors were related to similar names (60%) and similar shapes (58.4%). Regarding the principle of right dose, most of the errors (68.3%) were related to the inconsistency of the dose with the weight and age of the child. Given the principle of right patient, most of the errors (68.3%) were related to the lack of attention to the identification bracelet. Given the principle of right prescription, most of the errors (60%) were related to no alcohol use for disinfection of vial head. Regarding the right time of medication administration, the highest rate of errors (68.3%) was related to the non-administration of medication in due time and, finally, in terms of right recording, most of the errors (58.3%) were related to non-record of the prescribed medication in the nursing report section. Other findings are listed in Table 2.

Table 2

Frequency distribution and comparison of medication error reporting based on the eight principles of medication administration

Reporting rate Eight principles		Before the intervention				After the intervention			
Principle	The error	Zero	1–2	3–4	5	Zero	1–2	3–4	5
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
1.Right medication	Similar name	46 (76.7)	12 (20)	2 (3.3)	0	24 (40)	34 (56.7)	2 (3.3)	0
	Similar shape	38 (63.3)	18 (30)	4 (6.7)	0	25 (41.7)	24 (40)	10 (16.7)	1 (1.7)
	The place of the medication	52 (86.7)	7 (11.7)	1 (1.7)	0	37 (61.7)	20 (33.3)	3 (5)	0
	Inappropriate and unsafe prescribed medication	52 (86.7)	7 (11.7)	1 (1.7)	0	46 (76.7)	11 (18.3)	2 (3.3)	1 (1.7)
2.Right dose	Dose non-compliance with the prescription	48 (80)	10 (16.7)	2 (3.3)	0	23 (38.3)	29 (48.3)	7 (11.7)	1 (1.7)
	Dose non-compliance with the age and weight of the child	42 (70)	13 (21.7)	2 (3.3)	3 (5)	19 (311.7)	25 (41.7)	11 (18.3)	5 (8.3)
3.Right route	Oral administration Instead of intravenous	55 (91.6)	4 (6.7)	1 (1.7)	0	49 (81.7)	9 (15)	2 (3.3)	0
	intravenous administration Instead of Oral administration	54 (90)	5 (8.3)	1 (1.7)	0	51 (85)	9 (15)	0	0
	Intramuscular injection instead of intravenous and vice versa	55 (91.6)	5 (8.3)	0	0	51 (85)	9 (15)	0	0

Reporting rate		Before the intervention				After the intervention			
Eight principles									
4.Right patient	Prescribe medicine to another patient	46 (76.7)	13 (21.7)	1 (1.7)	0	22 (53.3)	23 (38.3)	4 (6.7)	1 (1.7)
	Lack of attention to the patient identification bracelet	52 (86.7)	5 (8.3)	2 (3.3)	1 (1.7)	25 (41.7)	26 (43.3)	7 (11.7)	2 (3.3)
	Administration of medicine based on bed number	46 (76.7)	13 (21.7)	1 (1.7)	0	32 (53.3)	19 (31.7)	8 (13.3)	1 (1.7)
5.Right prescription	No use of proper solvent	49 (81.7)	11 (18.3)	0	0	40 (66.7)	19 (31.7)	1 (1.7)	0
	Lack of observing proper infusion rate	41 (68.3)	16 (26.7)	3 (5)	0	24 (40)	27 (45)	8 (13.3)	1 (1.7)
	Lack of attention to drug interactions	44 (73.3)	13 (21.7)	3 (5)	0	34 (56.7)	23 (38.3)	3 (5)	0
	Lack of attention to medication precautions	50 (83.3)	10 (16.7)	0	0	45 (75)	13 (21.7)	2 (3.3)	0
	No use of micro if needed	52 (86.7)	8 (13.3)	0	0	44 (73.3)	15 (25)	1 (1.7)	0
	No use of infusion pump / syringe pump	54 (90)	6 (10)	0	0	41 (68.3)	16 (26.7)	3 (5)	0
	No hand hygiene	46 (76.2)	12 (20.2)	1 (1.7)	1 (1.7)	28 (46.7)	18 (30)	12 (20)	2 (3.3)
	No use of alcohol to disinfect the vial	49 (81.7)	6 (10)	2 (3.3)	3 (5)	24 (40)	15 (25)	18 (30)	3 (5)
	No attention to drug expiration rate	53 (88.3)	4 (6.7)	3 (5)	0	46 (76.2)	12 (20.2)	2 (3.6)	0

Reporting rate Eight principles		Before the intervention				After the intervention			
6.Right time	No observation of the correct time of medication (before or after meals, etc.)	45 (75)	14 (23.3)	1 (1.7)	0	39 (65)	18 (30)	3 (5)	0
	No give of the medicine on due time	40 (66.7)	20 (33.3)	0	0	19 (31.7)	31 (60)	5 (8.3)	0
	Not giving the drug in proportion to the number of times it is prescribed (e.g., every 8 hours every 12 hours)	52 (86.7)	8 (13.3)	0	0	37 (61.7)	22 (36.7)	1 (1.7)	0
7.Right record	Non-compliance of the recorded medication with the medication order	49 (81.7)	10 (16.7)	1 (1.7)	0	37 (61.7)	19 (31.7)	4 (6.7)	0
	Non-compliance of the recorded medicine shape with the medication order (ampoules instead of tablets or vice versa)	52 (86.7)	6 (10)	2 (3.3)	0	40 (66.7)	19 (31.7)	1 (1.7)	0
	Non-compliance of the medicine dose recorded in the cortex with the medication order	52 (86.7)	7 (11.7)	1 (1.7)	0	32 (53.3)	25 (41.7)	3 (5)	0

Reporting rate		Before the intervention				After the intervention			
Eight principles									
	Non-compliance of the frequency of the medicine prescribed in the cortex with the medication order (2 or 3 times a day)	49 (81.7)	11 (18.3)	0	0	40 (66.7)	16 (26.7)	4 (6.7)	0
	Non-change of a medicine's new shape in the cortex after being prescribed	46 (76.7)	14 (23.3)	0	0	35 (58.3)	24 (40)	1 (1.7)	0
	No record of the prescribed medication	46 (76.7)	14 (23.3)	0	0	25 (41.7)	33 (55)	2 (3.3)	0
	No prescription of the recorded medication	54 (90)	6 (10)	0	0	37 (61.7)	1 (31.7)	4 (6.7)	0
8.Right response to treatment	No assessment of the patient's response to treatment	48 (80)	9 (15)	3 (5)	0	37 (61.7)	15 (25)	8 (13.3)	0

In addition, the paired t-test showed that the mean of total score for the nurses' medication error reporting after the intervention in all principles was significantly higher than before the intervention ($P < 0.05$). The highest rates were related to the principles of right dose and right patient (Table 3).

Eight principles	Before intervention		After intervention		Paired t-test	
	Mean	Sd	Mean	Sd	T	P
1.Right medication	8.33	1.53	17.92	1.97	4.08	<0.001
2.Right dose	11.11	2.16	30	2.56	6.40	<0.001
3.Right route	3.33	1.13	5.74	1.43	1.40	0.16
4.Right patient	7.96	1.75	21.85	2.41	6.49	<0.001
5.Right prescription	7.53	1.24	17.04	1.64	6.14	<0.001
6.Right time	8.15	1.23	17.41	1.70	4.60	<0.001
7.Right record	6.03	0.99	15.32	1.46	5.91	<0.001
8.Right response to treatment	8.33	2.33	17.22	3.12	2.46	0.02
Total score	7.35	2.43	17.04	5.59	8.03	<0.001

Table 3

Comparison of the mean of total score for the nurses' medication error reporting (for each principles) before and after the intervention

Discussion

Reporting of medication errors is one of the challenges of the health system. Thus, the effect of motivational system on reporting rate was investigated in this study. According to the findings related to the right medication principle, the highest rate of error reporting was related to similar name. In this regard, the study conducted by Rezaei Farsani and Farokhpour showed that one of the most important causes of medication errors from the viewpoint of nurses was similar names and similar packing of the medicines (9). Therefore, the familiarity of nurses with similar names and abbreviations of the ward medicines is essential to avoid errors during the work.

In the present study, the most frequently reported error in the area of the right dose was due to the incompatibility of the dose with the weight and age of the child. This finding was consistent with the findings of Mozafari and Borji as well as those of Kouhestani and Baghcheghi (10, 11). Wrong dose usually occurs for a variety of reasons including unfamiliar medicine, lack of knowledge of medications, and incorrect medicine calculations (3).

The findings of the present study showed that there was no significant difference in the rate of medication error reporting for the principle of right route before and after the intervention. Given that this medication error is one of the most dangerous ones and can cause serious harm to one's health, fear of legal authorities and the difficulties it can cause to one's job continuation may lead nurses to refuse to report their errors related to this principle. However, different educations and increasing the awareness of nurses and paying more attention to this principle may have reduced this medication error.

Based on the results of the study in relation to the right time of medication administration, the highest rate of errors belonged to non-administration of medication in due time. In this regard, the results of the study by Tabatabaee et al. showed that the error of medication administration either before or after the due time had the highest frequency (12). Similarly, Mozafari and Borji also showed that 13.3% of oral medications and 18.3% of injectable medications were administered to patients in wrong time (10). Some conditions of the ward such as delay in patient's visit or delays in delivering medication to the ward may sometimes affect the right time of medication administration. Moreover, nurses sometimes give medications to patients sooner or later because of overcrowding or limited number of personnel.

Based on the results of the present study, the mean of total score for medication error reporting after the intervention was significantly higher than before the intervention ($P < 0.05$). Additionally, investigating each of the principles showed that the motivational system used in this study was effective and educational interventions or the creation of an environment without punishment and encouragement of personnel to report would promote reporting. Consistent with this finding, in the study of Farzi et al. entitled "Nurses' Experiences of Medication Errors in Isfahan Medical Centers" it was shown that nurses report their mistakes when they feel safe and when they are sure that their report lead to no harmful results for them (13).

The intervention of the present study showed that motivation is a force that can encourage individuals and increase error reporting. The awareness generated through training classes, positive reinforcement with rewards such as score and gift, were strategies used in this motivational system in collaboration with hospital officials. Marquis and Huston refer to positive reinforcement by emphasizing one's desirable behavior and being encouraged for repeating that behavior (14). Likewise, in their study entitled "the nurses motivating factors in relation to patient training," Toloei et al. showed factors such as job conscience, awareness, interest in work, recognition and appreciation, career advancement and job security have a great impact on nurses' motivation to train patients (15). Encouragement and appreciation are the strongest, simplest, and least costly ways to encourage people and develop a sense of satisfaction in them that in turn can lead to the promotion of positive self-esteem, satisfaction of self-esteem needs, self-actualization, and employee development. Acknowledgment, in addition to being an external reward, can create healthy competition and foster a sense of respect and gratitude in individuals. Nurses need to be appreciated more than others and, thus, they need more attention (16). In this study, after the intervention, the researcher observed that the nurses were more likely to report an error after passing a course of training and positive reinforcement. Furthermore, the matron's supports and emphasizing that there should not be any fear and anxiety increased reporting rate confirmed by statistical results.

Conclusion

The results of this study showed that the combination of training and motivational system improves reporting of medication errors in nurses. Given that error reporting is known as the basis for maintaining and enhancing patient safety and medication error reporting can be used as an opportunity to learn and prevent the repetition of errors, it is recommended that health care managers increase their quality of

medical care and improve the safety of hospitalized children by ongoing training and encouragement of personnel to report errors.

Declarations

Acknowledgement

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Ethics approval and consent to participate

For ethical considerations and confidentiality of the information, the questionnaires were used anonymously. The consent of the nurses was obtained and the project (code of ethics: 1397.338) was approved by the Ethics Committee of Isfahan University of Medical Sciences.

Competing interests

The authors declare that they have no competing interests.

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