Original Article

Improvement of medication error reporting: An applied motivation program in pediatric units

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Abstract:

BACKGROUND: The rate of reporting medication errors 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 program on reporting of medication errors in the pediatric units.

MATERIALS AND METHODS: A quasi-experimental study with pre- and post-test design was done through 60 nurses working in the pediatric wards of the selected hospital in Isfahan, Iran in 2018–2019. Nurses participated in the study through the 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 was conducted through a motivational program in two parts of training and positive reinforcement. Data were analyzed through the descriptive statistics (frequency, mean, and standard deviation [SD]) as well as inferential statistics (Wilcoxon test and paired t-test).

RESULTS: After the intervention, the most medication error reports (60%) were in the principle of right medication (similar name). Furthermore, the total score (SD) of medication error reporting was significantly increased from 7.35 (2.43) before the intervention to 17.04 (5.59) after the intervention ($t = 8.03$, $P < 0.001$).

CONCLUSIONS: Motivational program increased medication error reports. Therefore, the managers can improve medication care and the safety of children through continuous education and encouragement in the hospitals.

Keywords:

Care, Iran, medication errors, motivation, nurse, pediatrics

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Introduction

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.[1] For this reason, nurses in pediatric ward need to have sufficient knowledge and skills for managing medical care. In addition, medication care management should be done in an interprofessional collaboration culture and effective communication to prevent medication error and keep the safety of patients.[2]

According to the studies, the rate of reporting errors among nurses is lower than the actual rate.[2,3] Ghorbanpour Diz *et al.* in a study, conducted in the hospitals in Tehran, showed that only 28% of the 112 nurses who had medication errors over the last year had reported their errors.[4] In another study, 91.2% of the participants had reported at least a case of medication error during the last month.[5] Previous studies have been conducted on identifying the rate of medication errors. Regarding the rate of

medication errors in hospitalized children, it must be used two or more interventions as a system to develop solutions and involve nurses. In a study indicated that implementing the interventions were reduced about 57% medication error in the pediatric wards.[6] In the previous study mentioned to need a medication error reporting program that revealed the overall error rate, the error types and system breakdown points. Regarding a gap between the actual number of medication errors and reporting errors, we need a system has been effective in reporting medication error and improve quality assurance.[7]

According above, designing a motivational program to increase nurses' medication error reports may prevent the repetition of similar errors and destructive consequences. There are various interventions to design such a program, one of which is motivating through using techniques such as rewarding and positive reinforcement that can desirably influence the enhancement of the nurses' behavior.[8] Motivation is a requirement for the nurse's progress. Motivated nurses can have a better performance.[9] Therefore, it is necessary to pay more attention to the motivation of nurses to improve them in reporting attitude. Accordingly, in order to lessen medication errors and their various consequences and increase reporting of errors, the researchers designed a motivational program and evaluated the effect of this program on the rate of medication error reporting in the pediatric wards.

Materials and Methods

This quasi-experimental study was conducted with pre- and post-test design in one group. It investigated the effect of motivational program on medication error reporting among the nurses working in the pediatric wards of the selected hospital of Isfahan University of Medical Sciences from November 2018 to February 2019 in Isfahan, Iran. The researcher introduced herself and stated 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 in the selected pediatric wards in the hospital. Data collection tool was a two-part researcher-made questionnaire: (1) Demographic information and (2) Medication error reporting questionnaire based on eight medication administration principles. The frequency of medication reporting errors is classified according to eight principles of medication, including 32 questions in eight sections and based on the amount of reporting (0, 1–2, 3–4, and 5 report). The validity of the questionnaire was examined by ten faculty members of the Nursing Faculty of Isfahan University of Medical Sciences, and its reliability was measured using Cronbach's alpha (0.87).

The intervention of this study involved designing a two-part motivational program. The first part was a training program consisting 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 program which was done through collaboration of the head the nurses, educational supervisors, and the hospital authorities with providing positive reinforcement and reward. The nurses who had reported the highest rate of errors were eligible to receive positive reinforcement and reward in the pediatric wards.

The method of the research was such that the questionnaires were first distributed among all nurses in the three wards of the hospital along with giving information about the objectives of the research and then, the intervention was performed for 4 months through the autumn and winter season during which training sessions were held for the nurses advising the importance of medication errors reporting. A set of the same questionnaires was completed by the nurses as posttests. There is a form in the ward for reporting the medication errors that must be filling by the nurse. In collaboration with the patient-safety unit, the accuracy of the submitted reports was verified. Finally, the effect of the motivational program was measured based on the eight principles of medication administration by comparing the mean scores of the research subjects obtained from the medication error reports before and after the intervention. After the intervention, the nurses who were active in medication error reporting were appreciated according to the motivational program.

Data were analyzed using the descriptive (frequency distribution and mean) and analytical (Wilcoxon test and paired *t*-test) statistics. SPSS software (version 16, SPSS Inc., Chicago, IL, USA) was used for the data analysis in this study.

Ethical considerations

For ethical considerations and confidentiality of the information, the questionnaires were used anonymously. 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. The participant was informed about the purpose of the study and invited to the class. The consent of the nurses was obtained, and the study was approved by the Ethics Committee of Isfahan University of Medical Sciences (IR.MUI.RESEARCH. REC.1397.338).

Results

The mean (standard deviation) age of nurses was 31.43 (7.44) years with 7.20 (6.21) years of working experience. Most of the nurses were married 34 (56.7%) with bachelor's degree 56 (93.3%) and rotational shiftwork 53 (88.3%). The participating nurses reported that in the past 4 months before the intervention, the rate of the medication errors they committed or witnessed being done by a colleague has been 52 (86.7%), and that they had reported 45 (75%) of the errors. 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 ($P < 0.05$) [Table 1]. In addition, the paired t-test showed that the mean of total score for the nurses' medication error reporting was significantly higher in all principles after the intervention than before the intervention ($P < 0.05$). The highest rates were related to the principles of right dose and right patient [Table 2].

Discussion

In the present study, the total score of medication error reporting was significantly increased after the intervention and the most prevalent medication error was in the principle of right medication related to similar name. It is shown in a study that one of the most important causes of medication errors was similar names and similar packing of the medicines from the viewpoint of nurses.[10] Therefore, the familiarity of nurses with similar names and abbreviations of the ward medicines is essential to avoid the errors during the work time.

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 study.[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 the most dangerous one and may be seriously harmful to one's health, fear of legal authorities and the difficulties it can cause to one's job continuation may lead the 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, the right time of medication administration, the highest rate of errors

belonged to nonadministration of medication in due time. In this regard, Tabatabaee *et al*. showed that the error of medication administration either before or after the due time they had was the highest frequency.[12] Similarly, in another study showed 13.3% of oral medications and 18.3% of injectable medications were administered to patients in wrong time. In addition, in this study, the rate of nurses' errors in the administration of medication orders was evaluated and revealed that 60% of nurses did not wash their hands when they prepared medication.[11] In the hospital setting of this study, 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.

In the present study, investigating each of the principles showed that the motivational program 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, Farzi *et al*. revealed that the 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 program 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] Similarly, Toloei *et al*. showed motivation factors such as awareness, recognition, and appreciation and encouragement have a great impact on nurses.[15] Encouragement and appreciation develop a sense of satisfaction in nurses to the promotion of positive self-esteem, 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.[16]

In addition, interprofessional education program can improve the patient safety. In fact, the solving of medication care problems needs to implement an interprofessional team-based medication as well as improve the safety culture and teamwork climate in the hospital especial in pediatric wards.[17-19] In this study, the researcher observed that the nurses were more likely to report an error after passing a course of training and positive reinforcement. The nurses wanted to have these

Table 1: Frequency distribution and comparison of medication error reporting based on the eight principles of medication administration

Eight principles	Before intervention Reporting rate, *n* (%)				After intervention Reporting rate, *n* (%)				*P*
	Errors number								
	0	1-2	3-4	5	0	1-2	3-4	5	
1. Right medication									
Similar name	46 (76.7)	12 (20)	2 (3.3)	0	24 (40)	34 (56.7)	2 (3.3)	0	<0.001
Similar shape	38 (63.3)	18 (30)	4 (6.7)	0	25 (41.7)	24 (40)	10 (16.7)	1 (1.7)	<0.005
The place of the medication	52 (86.7)	7 (11.7)	1 (1.7)	0	37 (61.7)	20 (33.3)	3 (5)	0	<0.004
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)	<0.046
2. Right dose									
Dose noncompliance with the prescription	48 (80)	10 (16.7)	2 (3.3)	0	23 (38.3)	29 (48.3)	7 (11.7)	1 (1.7)	<0.001
Dose noncompliance 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)	<0.001
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	<0.11
Intravenous administration Instead of oral administration	54 (90)	5 (8.3)	1 (1.7)	0	51 (85)	9 (15)	0	0	59.0
Intramuscular injection instead of intravenous and vice versa	55 (91.6)	5 (8.3)	0	0	51 (85)	9 (15)	0	0	0.25
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)	<0.001
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)	2.32	
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 medication expiration rate	53 (88.3)	4 (6.7)	3 (5)	0	46 (76.2)	12 (20.2)	2 (3.6)	0	
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 h every 12 h)	52 (86.7)	8 (13.3)	0	0	37 (61.7)	22 (36.7)	1 (1.7)	0	
7. Right record									
Noncompliance 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	
Noncompliance 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	
Noncompliance 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	
Noncompliance 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	
Nonchange 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	0.03
No record of the prescribed medication	46 (76.7)	14 (23.3)	0	0	25 (41.7)	33 (55)	2 (3.3)	0	<0.001
No prescription of the recorded medication	54 (90)	6 (10)	0	0	37 (61.7)	1 (31.7)	4 (6.7)	0	<0.001
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	0.18

Table 2: Comparison of the mean total score for nurses' medication error reporting

Eight principles	Before intervention	After intervention	Paired *t*-test	
			t-test	*P*
Right medication	8.33 (1.53)	17.92 (1.97)	4.08	<0.001
Right dose	11.11 (2.16)	30 (2.56)	6.40	<0.001
Right route	3.33 (1.13)	5.74 (1.43)	1.40	0.16
Right patient	7.96 (1.75)	21.85 (2.41)	6.49	<0.001
Right prescription	7.53 (1.24)	17.04 (1.64)	6.14	<0.001
Right time	8.15 (1.23)	17.41 (1.70)	4.60	<0.001
Right record	6.03 (0.99)	15.32 (1.46)	5.91	<0.001
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

classes for interns and medical students. Furthermore, the matron supports and emphasizes that there should not be any fear and anxiety increased by reporting the rate confirmed by statistical results. In this study, there was only one group with a small sample size. Therefore, studies with larger samples are needed to produce more evidence regarding the effects of this motivation program.

Conclusions

The results of this study showed that the combination of training and motivational program 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. It is suggested to use other motivational strategies to improve medication error reporting. Moreover, it will be held the same training course for other personnel in the hospital and professions such as interns and medical students.

Conflicts of interest
There are no conflicts of interest.

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