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Original Article

Effect of Video Feedback on Adherence to Intravenous Insertion Standards in Nurses of Neonatal Intensive Care Unit

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ABSTRACT

Background: Many newborns are hospitalized in neonatal intensive care units (NICU) and undergo invasive procedures. Intravenous (IV) insertion is one of the most common painful invasive procedures performed on newborns. Thus, it is important to carry out this procedure according to the standards. The present study aimed to determine the effect of video feedback on nurses' adherence to neonatal IV insertion standards in selected hospitals affiliated to Isfahan University of Medical Sciences, Isfahan, Iran.

Methods: This study was conducted as a clinical trial on 60 nurses in selected hospitals affiliated to Isfahan University of Medical Sciences in 2018. In the control group, after filling out the pre-test checklist and recording the IV insertion processes, the procedures were implemented according to the NICU routines. After a month, the post-test checklist was filled out. In the intervention group, feedbacks were given to the nurses about the correct insertion of IV and their performance after filling out the pre-test checklist and recording the processes. After a month, the post-test checklist was filled out, and the data were analyzed by the independent t-tests, Fisher's exact test, Chi-square test, covariance analysis, and paired sample t-test using SPSS software (version 22).

Results: According to the findings, the mean score of adherence to neonatal IV insertion standards in the intervention group was about 59 before the intervention, but it increased to 78.7 after the intervention. The statistical test also indicated a significant difference in this practice before and after the intervention ($P < 0.001$). Moreover, the results of the independent t-test showed that the mean score of adherence to neonatal IV insertion standards had improved significantly in the intervention group after the intervention, compared to that in the control group ($P < 0.001$).

Conclusion: Use of feedback method can be effective in nurses' adherence to standards.

Keywords: Feedback, IV insertion, Neonatal intensive care unit, Nurses, Standard

Introduction

Standards describe a qualified level of performance based on which the quality, structure, process, and outcome of an action are evaluated (1). This is especially important in vulnerable groups, such as infants admitted to Neonatal Intensive Care Units (NICU). Hospitalized infants should face many invasive procedures (2). Intravenous (IV) insertion is one of the most common painful invasive methods, which is carried out repeatedly for the supply of fluid and electrolytes, intravenous infusion, and injection of medications to infants (3).

The results of studies indicate that the

implementation of standard medical protocols reduce the need for unnecessary and dangerous interventions in the treatment process, allow effective and appropriate decision making for the healthcare staff, reduce mortality rate, and lower costs (4, 5). Therefore, it is necessary to follow treatment protocols based on standards, especially in invasive procedures (6). One of the standard protocols in IV insertion is the use of the sterile technique (7). Strategies to prevent infection include the careful cleansing of the hands and general precautions, minimizing the risk of catheter infection and length of its application,

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careful skin care (8), training the staff and receiving their feedback, and monitoring the performance of NICU personnel (9, 10).

Another important issue in relation to the implementation of standard protocols is to alleviate the newborn's pain during the procedure. It has been shown that the management of pain in newborns and infants depends on the performance and attitudes of nurses and physicians with the nonfulfillment of pain mitigation strategy leading to short- and long-term complications (11-14). According to the notion of evolutionary care, the pain and stress of newborns should be controlled during every procedure to prevent future complications (15, 16). Therefore, the aforementioned principles are crucial to neonatal IV insertion.

Nurses should receive comprehensive feedback on their actions to be able to provide qualified cares to newborns. Feedback constitutes a vital part of education and training that helps creativity and progress in learners, acting as a factor with a considerable effect on learning (17, 18). Also, feedback is a critical component of effective learning in simulation-based training (19).

Considering the importance of attaining standards in reducing mortality rate, the importance of receiving feedback in learning skills and effective training of personnel, and the relatively high rates of hospitalization of newborns in NICU and mortality induced by circulatory infection, it is necessary that NICU nurses adhere to the standard protocols of IV insertion. Therefore, this study aimed to determine the effect of video feedback on nurses' adherence to neonatal IV insertion standards in selected hospitals affiliated to the Isfahan University of Medical Science, Isfahan, Iran.

Methods

This clinical trial was conducted in the NICU of Shahid Beheshti and Amin teaching hospitals, affiliated to Isfahan University of Medical Sciences in Isfahan, Iran, from February to May 2018. The study population consisted of nurses working in the NICU in selected hospitals affiliated to Isfahan University of Medical Sciences who met the inclusion criteria. The sample size was determined based on similar studies using the following formula (20):

$$n = \frac{2(z_1 - \alpha/2 + z_1 - \beta)^2 \times s^2}{d^2} = \frac{2(1.96 + 0.84)^2 \times s^2}{1.6 \times s^2} = 25$$

According to statistical calculations, in this

study, 25 nurses were required in each group. For controlling the sample loss, the number of the samples was considered to be 20% higher; hence, 30 subjects were assigned to each study group. Therefore, the final sample size was determined as 60 nurses. They were divided into two groups of intervention (n=30) and control (n=30). The subjects were selected via convenience sampling method, followed by random allocation. Random allocation was carried out among nurses working in the different shifts of NICU who met the inclusion criteria. After dedicating numbers to all nurses (from 1 to 30 for each hospital), a random sequence of numbers was generated by SPSS software. The first 30 nurses were registered as control, and other 30 nurses were considered as the intervention group (Figure 1).

The inclusion criteria of the study were: 1) bachelor's degree in nursing, 2) at least 6 months of clinical experience, and 3) currently working in NICU. The exclusion criteria consisted of nurses' unwillingness to fill out the checklist of adherence to neonatal IV insertion standards and non-cooperation of nurses in watching, discussing, and receiving feedback from the films.

The research instrument consisted of a self-administered checklist in two parts. The first part covered the demographic information of the nurses, and the second part consisted of 20 questions in four domains (i.e., pain control during IV insertion, observation of clean and sterile techniques, IV insertion based on protocols, and complications associated with IV insertion), which was filled out by the co-researcher. The 20-item checklist was rated as 0 or 1 (1=adherence and 0=nonadherence), which has a range of 20 to 100.

Considering the issue of studying both groups in the same unit of hospitals and probability of communicating with each other and affecting control group, we decided to first deal with the control group. Moreover, regarding the effect of video recording of IV insertion performance, we decided to record all nurses' IV insertion procedures. Thus, after filming their performance, the co-researcher who did not know about the kind of groups filled up a pre-test form for each nurse containing 20 questions in form of a checklist. Then, they started routine tasks for 30 days without taking any kind of intervention. Finally, the co-researcher observed those nurses and filled up the post-test form which was exactly the same as the pre-test checklist.

After this step, the researcher started studying the intervention group. To do so, the co-researcher attended the NICU and filled out a

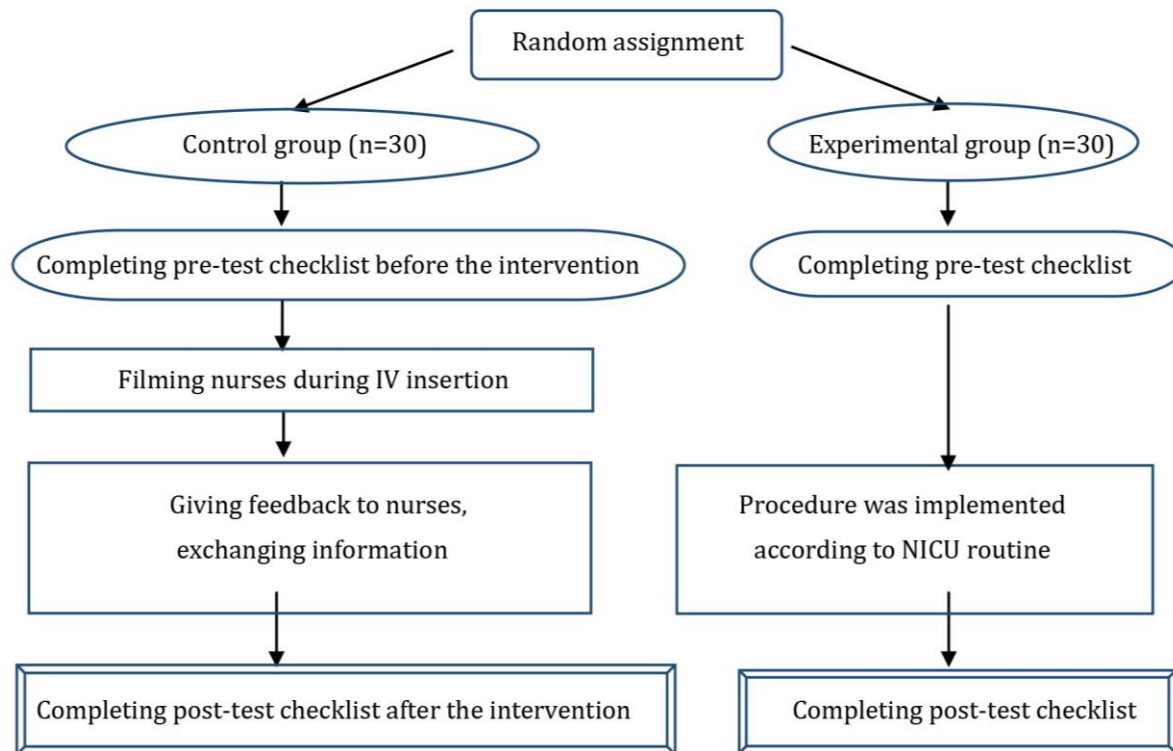


Figure 1. Consort diagram of the sampling method and interventional feedback process

pre-test identical to the one used for the control group. The researcher was present in various shifts and filmed the IV insertion procedure by a camera. Thus, 60 video clips were recorded with lengths varying from 3 to 20 min (before and after the intervention). The recorded clips included how to insert IV and compliance with standard rules, such as hand-washing, hand rubbing, pain management, and sterile technique.

After recording all nurses' IV insertion procedures, the recorded video of each nurse was shown to him/herself through individual sessions. Some of them allowed us to show their films to others. Then, their recorded video clips were played in a discussion and exchange of information meeting, and all nurses discussed the strengths and weaknesses, how to insert IV, IV insertion protocols and their adherence, difficulties associated with this procedure, and other issues.

After a month, the co-researcher attended the NICU to complete the post-intervention checklists. She monitored the IV insertion performance of the nurses in the intervention group and filled out the checklist accordingly. With regard to ethical considerations, this study was approved by the Ethics Committee of Isfahan University of Medical

Sciences and informed consent forms were obtained from nurses in relation to their cooperation and filming. This clinical trial has been registered under the code of IRCT31991.

Results

According to the results, the age range of the nurses in the intervention group was 23-48 years. Statistical tests showed that the mean age, work experience, length of working in the NICU, number of newborns supervised by nurses, and other characteristics were not significantly different between the two groups ($P > 0.05$). The results of the independent t-test revealed that the mean score of adherence to neonatal IV insertion standards before the intervention was not significantly different between the two groups ($P > 0.05$). But after the intervention, it was significantly higher in the intervention group ($P < 0.05$; Table 1).

The results of the paired t-test showed that the mean score of adherence to neonatal IV insertion standards in the control group before and after intervention had no significant change ($P > 0.05$). But in the intervention group, it was significantly higher after the intervention ($P < 0.05$; Table 2).

Table 1. Comparison of the mean score of adherence to neonatal intravenous insertion standards in two groups before and after the intervention

Time	Intervention		Control		Independent t	
	mean	SD	Mean	SD	t	P
Before intervention	58.83	10.23	59.75	7.75	0.39	070
After intervention	78.67	9.82	60.06	8.92	7.68	<0.001

Table 2. Comparison of the mean score of adherence to neonatal intravenous insertion standards in both groups before and after the intervention

Time	Before intervention		After intervention		Paired t-test	
	mean	SD	Mean	SD	t	P
Intervention group	58.83	10.23	78.67	9.82	12.23	<0.001
Control group	59.75	7.75	60.06	8.92	0.33	0.74

Table 3. Comparison of changes in the mean score of adherence to neonatal intravenous insertion standards after intervention in both groups

Group	Mean	SD	Independent t	
			t	p
Intervention	19.84	8.86		
Control	0.31	0.94		<0.001

The results of the independent t-test showed that after the intervention, the increase in the changes of the mean score of adherence to neonatal IV insertion standards was significantly higher in the intervention group, compared to that in the control group ($P < 0.05$) (Table 3).

Discussion

The results of this study revealed that after the intervention, the increase in the mean score of adherence to neonatal IV insertion standards was significantly higher in the intervention group, compared to that in the control group ($P < 0.05$). Therefore, it seems that feedbacks can positively affect the implementation of neonatal IV insertion standards in nurses.

Similarly, Mousavi et al. (2013) reported that video recording had a greater effect on improving neonatal resuscitation, compared to workshops (20). Briefing sessions with a video display of a nurse's performance during the resuscitation of newborns, due to the provision of feedbacks and training opportunities, can improve the performance of the resuscitation team. However, the results of a study by Carbine et al. showed that the observation of neonatal resuscitation did not have any significant effect on improving the clinical performance of nurses, and the score of the resuscitation quality was higher in resuscitations recorded after the briefing sessions. It should be noted that in this study, the subjects and resuscitation team did not receive any feedback on their performance (21)

Harish et al. (2013) found that simulated training improved the subjects' perception of knowledge, skills, and self-confidence to train

others in infant resuscitation. This study examined a combination of simulated neonatal resuscitation training together with a briefing session about the knowledge and skills of neonatal resuscitation educators using a self-report questionnaire. The study design and the method of assessing the knowledge and skills of subjects in performing the resuscitation are among the disadvantages of this study (22).

Considering the design of this study, its results were predictable and the effectiveness of the intervention and the increase in the mean score of standards implementation in the intervention group could be due to the individual characteristics of the intervention group, lapse of time, and constant presence of researcher and assistant in the department. But considering that the participation of both groups at two stages and the duration of training were the same, the effect of other factors can be ruled out. Therefore, it can be concluded that feedback, training sessions, and practice can be effective in increasing adherence to standards.

One of the limitations of this research is that we faced problems, such as the reluctance of personnel to filming their performance during the IV insertion procedure. Nonetheless, after recording the performance of other nurses and explaining its importance in mitigating difficulties associated with IV insertion and confidentiality of data, this limitation was largely eliminated.

Conclusion

The results of this study suggested that video feedback, training, and practice could be effective in increasing adherence to standards. Offering

feedbacks, allowing nurses to observe their own performance, and organizing briefing sessions in which the recorded videos of IV insertion procedure by nurses is screened, due to the provision of feedbacks and educational opportunities, can help enhance the mean score of adherence to neonatal IV insertion standards. It is recommended that future studies be conducted using a larger study population with greater sample size.

One major limitation of this study was that at first, nurses were reluctant to the filming of their performance, but after explaining the purpose of recording and capturing the performance of some of their colleagues, their willingness for cooperation was increased.

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Conflicts of interests

There are no conflicts of interest.

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