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Original Article

Study the effect of multimedia safety injection on nurses' performance at three levels during preparation, during injection and after injection

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ABSTRACT

Background and Objective: Injections are one of the most common nursing procedures and an integral part of the clinical role of nurses, which should be performed safely. Therefore, the aim of this study was to evaluate the effect of multimedia safety injection on nurses' performance at three levels during preparation, injection and after injection. Materials and Methods: The present study was a semi-experimental, one-group, pre and post design. The sample consisted of 50 nurses working in Minoodasht city, affiliated to Golestan University of Medical Sciences. Data gathering tool was a demographic questionnaire and a checklist for observing nurses 'performance about safe injections. The nurses' performance was checked before and six weeks after the training. The intervention was implemented as a multimedia educational program for 2 weeks for nurses. Data were analyzed by SPSS software version 16, descriptive statistics and paired t-test. Findings: The mean and standard deviation of nurses' performance during training before and was 3.15 ± 16.32 and after training was 1.40 ± 26.1 respectively. The mean and standard deviation during the injection before training was 2.11 ± 12.48 and after training was 1.31 ± 18.02. The mean and standard deviation after injection before training was 1.12 ± 11.08 and after the training was 0.99 ± 13.32 respectively. There was a significant difference between the three levels during preparation, during injection and after injection. (P <0.05). Conclusion: The findings of this study showed that safe multimedia injection training was effective on nurses 'performance at three levels during preparation, during injection and after injection. Therefore, it is recommended that use this educational approach to deal with unsafe injections and increase the quality of nurses' clinical nursing care and reduction of related risks.

Keywords: Multimedia education, safe Injection, performance, Nurse

Introduction

Injection plays an important role in the treatment of diseases, [1] one of the most common nursing procedures and an integral part of the clinical role of nurses, [2] which must be performed safely [3]. Safety in injections has attracted the attention of many people in medical sciences for many years, [4] and patient safety is one of the main concerns in the delivery of health services [5]. In this regard, as one of the main pillars of the care system, nurses have a major responsibility for maintaining the patient's safety [6]. Because it is safe according to the definition of an injectable injection that is not harmful to the patient, the provider and the community [7].

It is estimated that 16 billion injections are made annually in developing countries [8]. where 50% of these injections, especially in developing countries, are unsafe.[9] It also accounts for 1.3 million premature deaths, a loss of 26 million years of life, and $ 535 million in medical costs[10] and 9.18 million in life in 2030 [11].

Access this article online	
Website: www.japer.in	**E-ISSN:** 2249-3379

How to cite this article: Leila Mamashli, Shokoh Varaei. Study the Effect of Multimedia Safety Injection on Nurses' Performance at Three Levels During Preparation, During Injection and After Injection. J Adv Pharm Edu Res 2019;9(S2):80-89.
Source of Support: Nil, Conflict of Interest: None declared.

Unsafe injections lead to hepatitis C, hepatitis B and HIV, as well as abscess, skin irritation, septicemia, hematoma, ecchymosis and infection,[12,13] with hepatitis C, hepatitis B and HIV most dangerous. Because they can remain for long periods of time without signs, so an unsafe injection can lead to a silent epidemic that occurs years after the main events.[13] It also reduces life expectancy, productivity, and pressure on communities and health care systems at high cost of treatment.[2] unsafe injections lead to 33% hepatitis B, 42% to hepatitis C and 2% of HIV.[14] One of the causes of these diseases is contact with the infected needle, and 384,000 needle sticks occur each year in hospitals [15] . In the meantime, nurses have more talent for job injuries due to their work nature [16] and are more at risk than other employees [17].

Although it seems that nurses and other health workers adhere to safe injection methods,[18] Foda et al. (2017), contrary to this study, acknowledge the safety of injection,[15] and Van Tuong et al. (2017) also found that a small percentage of nurses were safely injecting [1]. The results of a study by Paul et al in 2011 entitled "Study on the safety of injections in nursing staff at Kolkata SSKM Hospital showed that handwashing with water and soap before injection (5.12%), cleaning the tray before injection (60%), wearing sterile gloves (3.7%) Cleaning the skin of the patient before injection (94.9%), disinfection of the injection site with sterile lavage (37.3%), correct intravenous injection (66.7%), needle cutting after injection (57.5%), insertion Needle cap (42.5%) and dropping the needle in the safety box (41.2%).[9] Such results also indicate the need for awareness about the proper functioning of nurses' safe injections. Recommendations for nurses have been suggested to achieve this [19]. However, it seems that observing safe injections is only possible through traditional educational approaches, and it would need to combine several educational methods [20].

In recent decades, traditional approaches to learning have changed with the emergence of new technologies such as multimedia education,[21] and its use in medical sciences has a special place[22] because if individuals involved more in their learning, they learn better, and higher learner's senses, learning levels also increase.[23] Studies show that people who get information through reading only 15% can remember it, and if they get a picture, they get 25%, and if they get both images and reading, up to 65% can recall the content [24].

However, due to the benefits of multimedia education, little attention has been paid to the implementation and evaluation of the effects of multimedia education on safe injection, and on the other hand, safety studies have shown poor performance of nursing staff in this regard. Therefore, the researcher decided to conduct a study aimed at the effect of safe multimedia injection training on nurses' performance at the three levels during preparation, during injection and after injection, so that this could be done to improve the quality of nursing care services. From complications of non-compliance with safe injections that cause long-term admissions Straw and increase the cost of services and prevent disease.

Method

This research was a quasi-experimental study of a pre and post design, which was conducted in Minoodasht Hospital affiliated to Golestan University of Medical Sciences. Failure to comply with safe injections based on the initial estimate, easy access, and the collaboration of the authorities was the main reason for choosing this hospital. The research population included nurses working in the wards of the hospital (emergency, domestic and women's surgery, internal medicine, and men and children surgery) at 3 workdays in the morning, evening and night. Considering the fact that the number of nurses working in the wards of this hospital was 50, a counting method was used for sampling. Entry requirements included the willingness to participate in the study and lack of administrative and regulatory responsibilities such as nursing director, supervisor, and head nurse. The researcher, after obtaining permission from the ethics committee of Tehran University of Medical Sciences, referred to the hospital, with code 662/130 / D 92, and explained the purpose of the study to the nurses in order to observe ethical considerations. All written samples were obtained written consent for participation in the study.

The data gathering tool was a questionnaire and a performance checklist. The first part of the questionnaire was related to demographic information (age, sex, level of education, history of participation in the program on the safety of injection, clinical experience, type of shift of employment) Validity and reliability of Nurses' observation checklist were calculated by Jalali Nia et al. (2006)[25] and 82% were reported.

The method of doing so was that each nurse's performance was monitored by a researcher and researcher's assistance through a three-time observation checklist in various shifts of the morning, evening and night. At each observation, if the nurse had completed the correct procedure, the score was one, and if not done, the score was zero; if there was no case for the action, the "item" option was considered for that term, which is the score It did not belong to it. Since the presence of the researcher could affect the way nurses function, the observer was continuously present in the various working shifts, in addition to normalizing and reducing the effect of his presence as much as possible on the actual performance of the nurses, also to reduce this confounding factor, each nurse was observed to perform each task three times in different work shifts.

On the other hand, due to the fact that several different parts of the hospital should be simultaneously examined, it was not possible for the researcher to be present simultaneously in all the departments, so the presence of the researcher was required. The checklist for the use of safe injection methods during preparation included 29 questions, which contained three levels of optimal performance (19.3 to 19.3 points), a relatively good performance (9.2-9.29 points), and poor performance (9.6- zero points) The rate of applying injectable injections during injection was 20 questions. In three levels, the optimal performance (13.4-20 points), the relatively optimal performance (6.7- 13.3) and unfavorable performance (6.6%) Ratings). The rate of applying injectable injections after injection was 15 questions, which was classified into three levels: optimal performance (11-15 points), relatively desirable

performance (10-6 points) and unfavorable performance (5-0 score).

The method was followed by first observing their performance and completing the performance checklist. Then a multimedia educational program was implemented. The training process included five five-hour two-hour training sessions for a total of 10 hours in two weeks, from 8:00 to 10:00 in one day. The maximum number of participants in each training session was 10 people. According to the statistics of nurses, 5 sessions were enough to cover the education of all of them. Each nurse participating in the study once participated in the training program. The training session was delivered as a speech with relevant slideshows, which lasted for 75 minutes, and its contents included general safety related injections, such as safe injection definitions, safe injection methods, which included all types of injections, including intradermal, subcutaneous injections, Intramuscular and intravenous injection before, during and after injection and instructions for safe injections prepared by the Ministry of Health and Medical Education.

Following the speech, a video from the World Health Organization containing articles about safe injections was also displayed for 30 minutes. At the end of each session, an open discussion session was arranged for 15 minutes to participate and comments were made and the participants' questions were answered. At the end of the sessions, a pamphlet was provided, summarizing the content presented at the training session, as well as a CD-ROM with audio and video (DVDs), along with films and slides for nurses. Then posters of 60 × 50 with the contents of messages about safety in injections were installed in all sections. Six weeks after the end of the training sessions for all nurses, their performance was re-evaluated using a functional checklist. Then, the scores for each of the performance sections were calculated. After data collection, using SPSS software version 16 and paired t-test, the data were analyzed before and after educational intervention.

Results

Table 1 shows that the average age of studied units was 28.5 ± 006. 78% of the women were female, 68% were under the age of 30, 94% had a bachelor's degree, 70% had a clinical experience of less than 5 years. 76% of the subjects did not attend classes on safe immunization, and all nurses participating in the study were working on a turn-by-turn basis (table1).

distribution of the frequency of performance of the units during the preparation of the injection before and after training, which indicates that in the name of the drug with the patient's case, the control of the name of the drug with the card, the control of the name of the drug before removing the shelf Medications, control the name of the medicine when removing the shelves, control the name of the medication when removing the shelves, control the expiry date, read the instructions in the medicine box or the label on the vial, control the timing of the medication, clean the tracheal injection before preparing the medication With antiseptic, wash hands with water and soap before starting work, if you have a wound on it, it will cover it with simple dressing. Wearing the wounds if there is a wound in the correct. 16 - Control the syringe (in terms of rupture, moisture and history of consumption). Control of the vials or ampoules for damage and contamination, control Serum or blood bag for leakage and contamination Removal of tarrails from cervical rubber after taking the drug for shaking the vial Using alcoholic coconut to protect when breaking the ampoules, calculating the correct dose of the drug, wearing disposable gloves for each intravenous injection, outside There is a statistically significant difference between the dropping of spikes with the probability of contamination ($P<0.05$)(table 2).

Distribution of the frequency of performance of the units studied during the injection before and after the training is shown. In asking the patient's name before the injection, explaining the injection to the patient, attracting the patient's contribution to the injection, asking the patient in The case of allergenicity, placing the patient in a suitable position for injection, maintaining the patient's privacy, determining the correct injection site, cleaning the skin in the region of injection periodically and from the center outward. Checking the venous injection site in terms of rebounding phlebitis, from the cleaning of the needle exchange for injection after taking the drug from the vial. Examining the patient's general condition Step injection (see and talk with the patient) there was no significant difference statistically ($P<0.05$) (table 3).

Distribution of the frequency of performance of the units studied after injection before and after training is shown. In the section on the examination of injection site in terms of possible complications of not inserting syringes and needles in the patient's environment, checking the injection site for possible complications There is a statistically significant difference in the washing of hands after the removal of gloves ($P<0.05$)(table 4).

Comparing the mean of performance scores before and after training, there is a significant difference between the three levels during preparation, during injection and after injection ($p<0.05$)(table 5).

Discussion and conclusion

The main purpose of the present study was to investigate the effect of multimedia injection safe injection training on nurses 'performance at the three levels during preparation, during injection and after injection. According to the results of Table 5 of this study, nurses' performance after training on safe injections There was a significant difference in the stage of preparation, during injection and after injection ($p<0.05$) This indicates that multimedia education has had a positive effect on the performance of nurses and is consistent with the study of Bahraini et al. (2011). In this study, the effect of a multimedia training program on the incidence of exposure to sharp and contaminated objects in the staff Nursing was studied. The results showed that in the intervention group, the incidence of exposure to sharp and contaminated objects after training significantly decreased ($P <0.05$), but no significant changes were observed in the control group. ($P<0.05$)[26] Also, the results of the Walters and Furyk (2010) study, which were

taught to nurses through the use of multimedia educational materials (booklets and pictures) of correct and safe muscle injections, showed that the performance of nurses was relatively safe for muscle injections and the risks associated with non-immune injection decreased.[27]

However, in the present study we have seen non-immune injection cases. So, in evaluating the performance of nurses before injection, only 10% of them cleared injectable before preparing the drug with an antiseptic agent and did not mention this lack of knowledge in this regard. The nursing staff in this study, although fully aware of blood-borne pathogens, thought that only Nidel Aceticisation would translate these diseases. In a study by Mehta et al., 99.03% of health workers [11] and in Paul et al. (2011), 60% of nurses were cleaning drug trays before injection [9].

In the present study, unfortunately, in the study of the performance of nurses before injection, it was observed that 80% of the expiry date of the drug, 68% of the subjects did not check the name of the drug when they returned to the drug shelf, as well as 64% of the drug users with the patient's case. And only checked it with a drug card that the drug was discontinued and not entered in the drug card, and 38% of the nurses read the label on the vial in the study, and in Mehta et al. Everyone read the label on the vial, which is a good way to prevent drug errors.[11] In the study of Seidi and Zardast (2012), 73.9% had a nurse's mistake in transferring drug orders from the case to the card index,[28] which is not a quantitative one. Yousefi et al. (1393) In our study, the causes of nurses' drug mistakes are the high number of nurses, the shortage of nurses to the number of patients in the department, the fatigue caused by excessive work, long and continuous shifts, lack of time and availability, attendance and crowding, the same package is similar to the drug or the similarity of the drug with another drug [29]. Fortunately, after the training, these errors were reduced in the present study.

In examining the performance of nurses before injection, it was observed that prior to training, the majority of samples (90%) did not use alcoholic beverages during the break-up of ampoules, due to lack of knowledge in this field, but after training (88%) of people used alcohol to protect themselves. In the Chaudhuri and ray study, 20% of midwifery nurses and 100% nurses broke the ampules in the right way [13]. In a study by Mehta et al., 54.83% used the cover when breaking the ampoules [11].

One of the issues that greatly affects patient safety is infectious disease. These infections can spread to the patient in a variety of ways [30]. One of these ways can be the pollution of drugs and vials that are in contact with the environment. To do this, it is necessary to disinfect vials and ampoules with an antiseptic-stained swab.[31] However, in the present study, 6% of the nurses used an antiseptic-stained swab to disinfect vials and ampoules, and after training, this was evident, and the reason for not doing so was not to care for this The topic was mentioned and believed that the vial cap removed and its plastic part was sterile, but in the study of Gyawali et al. (2016), 54.4% of the multidose vial was cleaned before use with alcohol cotton.[32]

On the other hand, hygiene plays a significant role in the control of infectious diseases,[33] but nurses neglect this, so far as studies show this fact, despite the simplicity, affordability and comfort of hand hygiene, This is less than expected by them,[34] in the study by Paul et al. Only 12.5%,[9] in the study by Omorogbe et al. 4.4% [10] and in the study Garapati Peethala and[35] 29%, in Tuong et al., 63.1%[1] and in the Chaudhuri and ray study,[13] everyone was using their hands before injection. But in the present study, only 28% of nurses wash their hands with soap and water, due to the lack of time, crowding, and lack of attention and understanding, but after training this item was reduced and all individuals (100%) did not pay attention to the importance of washing. This indicates that the implemented educational intervention has made a good change in the performance of nurses. The results of this study are in line with Allegranzi et al. (2009). In their study, they examined the use of multiple interventions including monitoring, hand sanitation, feedback, staff training, and the installation of visual reminders at the workplace, awareness, perception and performance of the staff. The results indicated that health complications rose from 8% to 21.8% ($p<0.001$) [36].

Although today, apparently, anywhere in the world, no health personnel use a syringe to inject a drug or vaccine, but in any case, in poor countries and many people, and especially injecting drug users, they use syringes repeatedly,[37] and if the syringes are not safely repelled and these syringes are contaminated with blood from people with blood-borne diseases, they can be harmed to these people.[38] It was observed that none of the nurses used Auto Disable syringes because of the lack of knowledge of the hospital about the presence of such syringes. However, after providing the training required by the researcher, neither of the personnel used these syringes, because the hospital did not supply such syringes due to the high cost of personnel. This is where the planners and authorities deserve to pay attention to this matter and provide the appropriate conditions for the optimal service of the hospital. But in the study of chadhury et al., All nurses used midwives for these syringes and nursing staff used ordinary syringes,[13] 53.33% did not recap.

A remarkable point in the present study is the fact that 96% of the units did not recapture the syringe, and immediately after use they placed it in the safety box. This is a place of hope, because it reduces the risk of negligence and its negative consequences. In Muralidhar et al., 50% [39]. Gyawalie et al., 8/37,[32] Omorogbe et al., 23%,[10] Paul et al., 42.5%[9] and Chadhury, 53.33%[13] of the subjects studied the syringe after using Recipe. Putting needle cap (42.5%), they recaptured the syringe. This contradiction in the results in studies around the world with the present study can be attributed to the general supervision of this hospital on this subject.

Conclusion

The present study showed that safe multimedia injection training on nurses 'performance was effective at three levels during preparation, during injection and after injection. Therefore, it is recommended that the quality of nurses' clinical nursing care and reducing the risks associated with non-immune injection This educational approach is used to improve nurses 'performance in the field of health and treatment of patients' health and comfort, and it is recommended that Nursing managers review traditional education and use a multimedia approach in the workplace and Continuously informing nurses about safe injections in this area By updating and allocating sufficient resources to moderate the risk factors of this disorder.

Acknowledgements

This article is the result of a nursing graduate degree completed by supporting of Tehran University of Medical Sciences and Health Services at the Faculty of Nursing and Midwifery. Researchers appreciate the staff of health centers affiliated to Golestan University of Medical Sciences.

Peer Review

Not commissioned. Externally peer reviewed.

Conflicts of interest

The authors declare that they have no competing interests.

Funding

None

Ethics committee approval

The license has been achieved by the Ethics Committee of the Tehran University of Medical Sciences was taken at code 662/130 / d / 92 on 2013.

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Table 1: Distribution of the studied units according to demographic information

Mean and standard deviation	Percent	Number	Demographic features	

	78	39	Female	Gender
	22	11	Male	
	100	50	Total	
	68	34	Under 30 years old	
	30	15	30-40 years	Age
28.0 ± 5.006	2	1	Over 40 years old	
	100	50	Total	
---	6	3	Associate degree	Education
	94	47	Masters	
	100	50	Total	
	70	35	Under 5 years old	
	20	10	10-5 years	History of clinical work
59.51 ± 50.80	10	5	Over 10 years old	
	100	50	Total	
	24	12	Yes	Participating in retraining classes
	76	38	No	
	100	50	Total	

Table 2: Frequency distribution of the units under study in terms of the use of safe injection methods during pre- and post-intervention preparation

After training					Before training				
P value	Standard deviance	Mean	No number (percent)	Yes number (percent)	Standard deviance	Mean	No number (percent)	Yes number (percent)	Variable
0	0.19	0.96	2(4)	48 (96)	0.48	0.36	32 (64)	18 (36)	Control the name of the medicine with the patient's profile
0	0.19	0.96	0	50(100)	0.48	0.36	1(2)	49(98)	Control the name of the medicine with the documents
-	0.0	1		50(100)	0.0	1	0	50(100)	Control the name of the medicine with the name of the patient
0.32	0.0	1		50(100)	0.14	0.98	1(2)	49(98)	Control of drug administration
0.32	1		50(100)	0.14	0.98		9(18)	41(82)	Control the name of the medicine before taking from the medication shelf
0	0.14	0.98	1(2)	49(98)	0.5	0.46	27(54)	23(46)	Control the name of the medicine when taking from the shelf
0	0.14	0.98	1(2)	49(98)	0.47	0.32	34(68)	16(32)	Control the name of the medicine before returning to the medication shelf
0	0.14	0.98	3(6)	47(94)	0.47	0.32	50(100)	0	Control the expiry date of the drug
0	0.14	0.98	1(2)	49(98)	0.49	0.38	31(62)	19(38)	Read the instructions inside the medicine box or label on the vial
0.04	0	1	0	50(100)	0.37	0.84	8(16)	42(84)	Calculate the correct dose of medicine
0	0	1	0	50(100)	0.43	0.76	12(24)	38(76)	Control the timing of the medication
0	0.14	0.98	1(2)	49(98)	0.3	01	45(90)	5(10)	Cleaning the tral injections before preparing the drug with an antiseptic agent
0	0	1	0	50(100)	0.45	0.28	36(72)	14(28)	Wash hands before starting work
0	0.24	0.94	3(6)	47(94)	0.49	0.42	29(58)	21(42)	Wound up wounds if there is a wound in the right
0.01	0	1	0	50(100)	0.41	0.78	11(22)	39(78)	Wear disposable gloves for each intravenous injection
0	0.19	0.96	2(4)	48(96)	0.32	0.12	44(88)	6(12)	Control of syringe cover (in terms of tear, moisture and consumption history)

0	0.19	0.96	2(4)	48(96)	0.44	0.26	37(74)	13(26)	Control of ampoules or vials of the drug for damage and contamination
0	0.24	0.94	3(6)	47(94)	0.5	0.5	25(50)	25(50)	Control of the serum or blood bag for leakage and contamination
-	0	1	0	50(100)	0	1	0	50(100)	Use sterile scarves and syringes
-	0	1	0	50(100)	0	1	0	50(100)	Use a special needle and syringe for each injection
-	0	1	0	50(100)	0	1	0	50(100)	The use of angiocot and sterile scalp and disposable
-	0	1	0	50(100)	0	1	0	50(100)	Use a sterile needle to take medicine from the vial
0	0.5	0.54	23(46)	27(54)	0.24	0.06	47(94)	3(6)	Removing spikes from cervical rubber after taking the drug to shake the vial
0.02	0	1	0	50(100)	0.38	0.82	9(18)	41(82)	Eject sparrows with the possibility of contamination
0.07	0	1	0	50(100)	0.38	0.86			Replacing needle with the possibility of damage
0	0.32	0.88	6(12)	44(88)	0.3	0.1	45(90)	5(10)	Use of alcoholic cotton when breaking the ampoules
1	0.24	0.06	47(94)	3(6)	0.24	0.06	47(94)	3(6)	Use of an antiseptic agent impregnated with sulphates and ampoules
-	0	1	50(100)	0	0	1	50(100)	0	28. Use of Auto-Disable Syringes in Common Patients for Blood Transfusions
0.07	0	1	0	50(100)	0.35	0.86	7(14)	43(86)	29-Replacing Disposable gloves for IV injection for the next patient

Table 3: Frequency distribution of the units under study in terms of the use of safe injection methods during injection before and after interventional training

After training					Before training				
P value	Standard deviance	Average	number No (percent)	number Yes (percent)	Standard deviance	Average	number No (percent)	number Yes (percent)	Variable
0.15	0	1	0	50(100)	0.19	0.96	2(4)	48(96)	Controlling the name of the medicine with the patient's name on the card
0	0.2	0.96	2(4)	48(96)	0.5	0.48	7(14)	43(86)	Ask the patient before taking the injection
0	0.24	0.94	3(6)	47(94)	0.27	0.08	46(92)	4(8)	Description of the correct injection to the patient
0	0.24	0.94	2(4)	48(96)	0.45	0.28	36(72)	14(28)	Attracting patient's cooperation for injection
0	0.24	0.94	3(6)	47(94)	0.44	0.26	37(74)	13(26)	Ask a patient about drug allergies
0.44	0	1	0	50(100)	0.27	0.92	4(8)	49(92)	Putting the patient in proper position for injection
0	0	1	0	50(100)	0.35	0.86	7(14)	43(86)	Keeping patient's privacy
0.01	0	1	0	50(100)	0.33	0.88	6(12)	44(88)	Determine the correct injection location
0	0.3	0.9	5(10)	45(90)	0.47	0.32	34(68)	16(32)	Clean the skin of the injection area periodically and from the center to the outside
-	0	1	0	50(100)	0	1		50(100)	Cleaning the skin of the injection area with alcoholic cotton
0	0	1	0	50(100)	0.5	0.46	27(54)	23(46)	Check for venous injection site for phlebitis
0.42	0.33	0.12	50(100)	0	0.27	0.08	50(100)	0	Use of disposable swabs impregnated with antiseptic to clean the skin
0	0.3	0.9	5(10)	45(90)	0.49	0.36	32(64)	18(36)	Non-touch the skin of the injection area after cleaning
0.18	0.14	0.98	1(2)	49(98)	0.27	0.92	3(6)	92(46)	Use a clean garage in the intravenous injection
0	0.49	0.36	32(64)	18(36)	0.3	0.1	45(90)	5(10)	Replacing the needle for injection after taking the drug from the vial

-	0	1	0	50(100)	0	1	0	50(100)	Keep the organ immobile while injecting
-	0	1	0	50(100)	0	1	0	50(100)	Ensure that the needle is inserted into the vein in intravenous injections
-	0	1	0	50(100)	0	1	0	50(100)	Aspirating the syringe after entering the muscle, before injection into the muscle
0	0.19	0.96	1(2)	48(96)	0.5	0.52	24(48)	26(52)	Reviewing the patient's general condition during injection (seeing and speaking with the patient)
-	0	1	0	50(100)	0	1	0	50(100)	Use of pressure pads in the event of bleeding from the injection site after the end of injection

Table 4: Frequency distribution of studied units according to the application of safe injection methods after injection before and after educational intervention

After training					Before training				
P value	Standard deviance	Average	number No (percent)	number Yes (percent)	Standard deviance	Average	number No (percent)	number Yes (percent)	Variable
1	0.2	0.04	48(96)	2(4)	0.2	0.04	48(96)	2(4)	Put the needle cover after injection
-	0	1	0	50(100)	0	1	0	50(100)	Do not bend spat after injection
0.15	0	1	0	50(100)	0.2	0.96	2(4)	48(96)	Do not detach the needle from the syringe after injection
0.15	0	1	0	50(100)	0.2	0.96	2(4)	96(48)	No use of the two-handed method for inserting the needle cover after injection
0	0.35	0.86	7(14)	43(86)	0.45	0.28	36(72)	14(28)	Check injection site for possible complications
0.04	0	1	0	50(100)	0.27	0.92	4(8)	46(92)	Taking syringes and needles around the patient's environment
-	0	1	0	50(100)	0	1	0	50(100)	Put needles and syringes in a special box to collect used syringes and needles
-	0	1	0	50(100)	0	1	0	50(100)	Cut the needles with a special cutter
-	0	1	0	50(100)	0	1	0	50(100)	Non-use of a refractory box for collecting syringes and needles used
-	0	1	0	50(100)	0	1	0	50(100)	10. No reuse of the special box for collecting syringes and needles used
0.11	0.33	0.88	6(12)	44(88)	0.43	0.76	3(6)	38(76)	Closure in a refractory box Specially collect syringes and needles completely after filling
-	0	1	0	50(100)	0	1	0	50(100)	Control to ensure that the syringe box and sprockets are disposed of in a safe place, away from other people and without harm to others.
0.08	0	1	0	50(100)	0.24	0.94	3(6)	4(94)	Put the used gloves in a non-penetrating bag
0	0.4	0.8	10(20)	40(80)	0.47	0.32	32(64)	18(36)	Wash hands after removing gloves
-	0	1	0	50(100)	0	1	0	50(100)	Register the prescription in the drug registration dossier (write a report)

Table 5: Comparison of the average performance score at three levels during preparation, during injection and after injection before and after training

Variable		Mean and standard deviance	Statistical test
During preparation	Before training	3.15 ± 16.32	Paired t test t= -21.94 df=49 (P<0.05)
	After training	1.40 ± 26.1	
During injection	Before training	2.11 ± 12.48	Paired t test t= -17.68 df=49 (P<0.05)
	After training	1.31 ± 18.02	
	Before training	1.12 ± 11.08	Paired t test t= -10.61 df=49 (P<0.05)