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The Effect of Subcutaneous Heparin Injection Administration Training Given to Nurses on Their Knowledge and Skill Levels

Hemşirelere Verilen Subkutan Heparin Enjeksiyon Uygulama Eğitiminin Bilgi ve Beceri Düzeyleri Üzerine Etkisi

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ABSTRACT

Objective: The aim of this study is to identify the lack of knowledge about subcutaneous injection application of nurses and to examine the effectiveness of the training given to increase their knowledge, skills in this direction.

Methods: The study was a quasi-experimental study using a pretest-posttest design involving 42 nurses (21 in the intervention group and 21 in the control group) selected by lottery from a public hospital in Türkiye. The intervention group received training on subcutaneous injection administration, while the control group did not receive any training. Data were collected through three follow-up sessions by two observers using forms containing skill checklists and information suggestions for nurses.

Results: Significant differences were found between the intervention and control groups before (Z=-2.231, *p*=.026), after (Z=-5.590, *p*<.001) and one month after (Z=-4.712, *p*<.001) the training. Common errors in the intervention group after the training were "injecting the drug and airlock quickly" (94.24%) and "squeezing dry cotton tampon" (38.10%). In the control group, 33.33% "did not squeeze the tampon between the ring and pinky finger". There was also a significant difference in knowledge scores according to the duration of education (*p*<.05).

Conclusion: The knowledge and skills of the nurses who received training in subcutaneous heparin injection application increased after the training.

Keywords: Knowledge, nurse, skills, subcutaneous injection

ÖZ

Amaç: Bu çalışmanın amacı hemşirelerin subkutan heparin enjeksiyon uygulaması konusunda bilgi eksikliklerini tespit etmek ve bu yönde bilgi, becerilerini artırmak için verilen eğitimin etkinliğini incelemektir.

Yöntemler: Araştırma, Türkiye'deki bir kamu hastanesinden kura yöntemi ile belirlenen 21'i müdahale, 21'i kontrol grubunda olmak üzere 42 hemşirenin katıldığı, randomize kontrollü ön test-son test tasarımının kullanıldığı deneysel bir çalışmadır. Müdahale grubu subkutan enjeksiyon uygulaması konusunda eğitim alırken, kontrol grubuna eğitim verilmemiştir. Veriler, beceri kontrol listeleri ve hemşireler için bilgi önerileri içeren formlar kullanılarak iki gözlemci tarafından üç takip oturumu aracılığıyla toplanmıştır.

Bulgular: Müdahale ve kontrol grupları arasında eğitim öncesi (Z=-2.231, *p*=.026), sonrası (Z=-5.590, *p*<.001) ve bir ay sonra (Z=-4.712, *p*<.001) anlamlı farklar bulunmuştur. Eğitim sonrası müdahale grubunda yaygın hatalar "ilacı ve hava kilidini hızlı enjekte etme" (%94,24) ve "kuru pamuk tamponu sıkma" (%38,10) olarak belirlenmiştir. Kontrol grubunda %33,33 "tamponu yüzük ve serçe parmak arasında sıkmadı" belirtilmiştir. Ayrıca Eğitim süresine göre bilgi puanlarında da anlamlı farklılık saptanmıştır (*p*<.05).

Sonuç: Subkutan heparin enjeksiyon uygulaması konusunda eğitim alan hemşirelerin eğitim sonrasında bilgileri ve becerileri artmıştır.

Anahtar Kelimeler: Beceri, bilgi, hemşire, subkutan enjeksiyon

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Introduction

Nurses assume a very important role in the protection and development of individual, family and community health by adhering to the regulations (Atabek Aştı & Karadağ, 2012).

Drug administration, which is one of the practitioner roles of nurses in drug management, is a multidisciplinary process in which nurses blend all their knowledge and skills, dependent and independent roles (Çit, 2014; Uslusoy et al.,, 2016; Kalra et al., 2017). Subcutaneous (SC) heparin injection, one of the parenteral drug applications, is the administration of the drug into the loose connective tissue (adipose tissue) between the dermis and muscle layer (Akça Ay & Süzen, 2012; Kılıç & Midilli, 2017).

DMAH (low molecular weight heparin), an anticoagulant used in interventions such as thrombolytic therapy, coronary bypass and vascular surgery, is frequently preferred due to its stronger anticoagulant effect, longer duration of action and less haemorrhagic effect compared to standard heparin (Berman, Snyder, & Frandsen, 2016). Application to the wrong site, lack of rotation, long needle tip, use of large syringe, painful injection, failure to make an airlock, aspiration and subsequent massage increase the risk of systemic bleeding, regional ecchymosis, haematoma and pain (Akbari Sari et al., 2014; Usach et al., 2019).

In subcutaneous drug administration, nurses should be aware of current literature information and regular training, error reporting processes and patient safety culture to prevent drug errors and complications (Uslusoy et al., 2016; İnangil & Şendir, 2017; Kılıç & Midilli, 2017; Büyükyılmaz et al., 2018; Usach et al., 2019).

Learning, which is the result of permanent changes provided by experiences in the individual, manifests itself in cognitive, affective and psychomotor learning areas such as patient assessment and care delivery in nursing education (Eyikara & Baykara, 2018; Houghton et al., 2012; Yılmaz et al. 2016). Nursing education aims to strengthen the culture of patient safety by increasing knowledge and skills in patient-nurse communication, fulfillment of nursing roles, and drug administration. (Tuna, 2015).

In our country, studies on SC injection training are limited and relevant studies emphasize that these trainings are important in increasing the knowledge and skills of nurses (Taşcı et al., 2018; Turaç & Ünsal 2018). Determining the knowledge and skills of nurses on SC injection, evaluating current practices and identifying training needs will be provided. Our study is expected to play an important role in standardizing SC injection practices.

This study aims to determine the knowledge and skill deficiencies of nurses in SC injection practices and to examine the effectiveness of the training program.

Methods

Study Design, Sample and Setting

In the pretest-posttest quasi-experimental design conducted on 400 nurses working in a public hospital between August 2019 and September 2020, 190 nurses were reached in line with the sample selection criteria, and a total of 98 nurses who were in the corona service (n=50), diagnosed with covid-19 (n=25) and did not want to participate (n=21) were excluded from the study. 50 of 92 nurses were excluded from the study because their knowledge score was above 50%. The remaining 42 nurses were assigned to the intervention (n=21) and control (n=21) groups by lottery. The study was conducted with nurses who provided care in the clinic and administered SC heparin. Inclusion criteria were nurses who provided care and treatment in the clinic, administered SC heparin injection and agreed to participate.

Exclusion criteria: Other healthcare personnel (e.g., physicians, midwives, emergency medical technicians, health officers), training, supervisory and managerial nurses, nurses working in units where SC heparin injections are not administered, nurses administering SC injections such as vaccines and insulin, those with verbal communication barriers, nurses diagnosed with Covid-19, nurses working in Covid-19 units, and nurses who refused to participate in the study.

Instruments and Procedure

In our study, as illustrated in Figure 1, nurses were informed about the research, and written and verbal consents were obtained from both the nurses and patients receiving low molecular weight SC heparin injections. The researcher arranged appointments to observe the nurses during SC injection administration at appropriate times.

At the first follow-up, the nurses completed the 'SC Injection Practice' and 'Individual Introduction Form'. Those whose knowledge deficiency was above 50% were assigned to the control and experimental groups by lot and only the intervention group received training. Data were collected by one researcher and two observers through open observation and blinding was not performed. A pilot study was conducted with 10 nurses to ensure the reliability of the skills checklist, one of the data collection forms, and these nurses were excluded from the main study (Wiersma, 2000; Yıldırım & Şimşek, 2008).

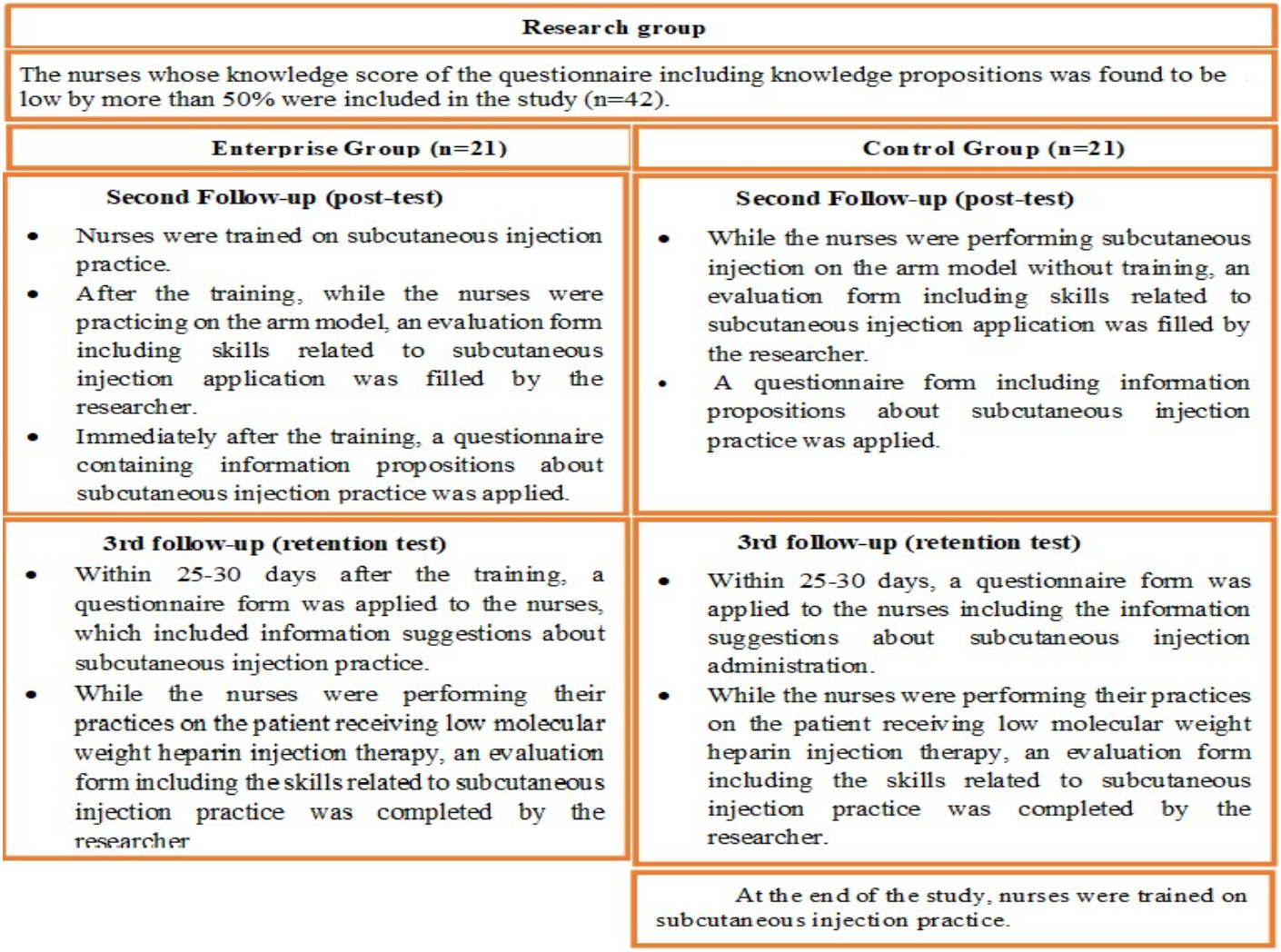

Figure 1. Research design

In the second follow-up, nurses in the intervention group received 30-45 minutes of training in groups of seven. The training included lectures, question-answer sessions, arm model demonstrations and PowerPoint presentations. Afterwards, a checklist was completed while the nurses practiced on the arm model and then the 'Knowledge Questionnaire on SC Injection Practice' was administered.

In the third follow-up, the researcher observed the nurses 15-30 days after the training to evaluate the effect of the training. The nurses completed the "SC Injection Administration Skill Checklist" and completed a knowledge questionnaire while administering injections to heparin-treated patients.

Control group: "SC Injection Information Form" and 'SC Injection Skill Assessment Form' were administered to nurses with a failure rate above 50%.

In the third follow-up, nurses' SC injection practices for heparin patients were observed within 15-30 days, and a checklist was completed. All nurses received 30-45 minutes of SC injection training. Data collection involved the Individual Identification Form, Knowledge Questionnaire on SC Heparin Injection, and Skills Checklist for SC Injection Sites.

Individual Diagnosis Form for Nurses: This 13-question form, created by the researcher based on the literature gathers sociodemographic characteristics of the nurses, including age, gender, marital status, education, years of employment, department, weekly working hours, number of SC heparin injections, in-service training status, and training requests (Akpınar et al., 2010; Turaç ve Ünsal, 2018; Yılmaz et al. 2016).

SC Injection Information Recommendations Form: This form consists of 20 questions on location determination, application techniques, and complication prevention for SC

injections. It includes ten true/false questions for the nurses to answer (Crawford ve Johnson, 2012; Demircan ve Gülseven, 2020; Kazan ve Görgülü, 2009; Tuna, 2015).

Knowledge Score: The assessment consists of 20 questions, each scored out of 100, with a validity of 0.56 using the Kuder-Richardson test (KR 20).

Skill Checklist: A form containing 33 steps was created to evaluate the SC injection practices of the nurses. The researcher recorded whether the steps were "applied", "not applied" or "should be corrected" with a validity of 0.71 using KR 20.

Expert Opinion Form: Feedback was obtained from five faculty members on the 'SC Injection Knowledge Questionnaire' and 'SC Injection with Heparin Skill Checklist.' Items were rated as 'appropriate', 'not appropriate', or 'should be corrected.' Additional input was requested for items needing corrections, and revisions were made accordingly.

Training Materials: Arm model, PowerPoint presentation and brochure were used in the training of nurses.

Arm Model: It is a life-size, foreign origin model made of PVC material and has SC injection application areas. The application areas are covered with sponge.

PowerPoint Presentation: A presentation on 'SC injection application' was prepared to inform nurses. The content was created by the researcher in line with the literature and includes theoretical and practical issues (Cengiz, 2014; Çit, 2014; Morissette, 2015; Bişkin Çetin ve Cebeci, 2021).

Brochure: A brochure titled 'SC Injection Practice' was developed to summarise important information about SC injection practice for nurses. The content of the brochure is also based on the literature (Bişkin Çetin ve Cebeci, 2021; Cengiz, 2014; Çit, 2014; Morissette, 2015).

Statistical Analysis

The data were analysed using SPSS 21.00 software. The suitability of normal distribution was examined with the Shapiro-Wilk test, and nonparametric tests were used for variables that did not fit the normal distribution. Number, percentage, mean and standard deviation analyses were performed for descriptive findings. Mann Whitney U test and chi-square test were used for intergroup comparisons. Mann Whitney U, Wilcoxon and Friedman tests were applied for changes over time. Statistical significance was accepted as 0.05. The KR 20 result of the questionnaire was 0.56 and the KR 20 result of the checklist was 0.71.

Ethical Approval

Written permission was obtained from Manisa Celal Bayar University Institute of Health Sciences and Faculty of Medicine Ethics Committee (Approval: 13.11.2019, 20.478.486) and Provincial Health Directorate with decision number 2020-37. The purpose and scope of the study were explained to the participants and their consent was obtained. All stages were carried out in accordance with the Helsinki Code of Ethics.

Results

When the data of the nurses in the individual identification form were analysed, the mean age was 32.16±8.02 years; 45.2% (n=19) were 33 years and older. 47.6% were undergraduate graduates; 33.3% (n=7) in the intervention group and 61.9% (n=11) in the control group were undergraduate graduates. When homogeneity was examined according to chi-square analysis, it was found that the groups were similar in terms of age, marital status, educational status and other characteristics (Table 1) (p>.05).

Skills of the nurses in the intervention group regarding subcutaneous heparin injection practice after training and 1 month after training

The most common procedures performed by the intervention group nurses after the training according to the recommendations for heparin subcutaneous injection skills were as follows: Checking the patient's information and adjusting the needle angle 100% (n=21), cleaning the injection site with antiseptic 94.24% (n=20), holding the skin with pinching technique 94.24% (n=20), preparing the equipment 95.24% (n=20) and injecting the drug and airlock quickly 94.24% (n=20).

One month after the training, the most frequently "practiced" procedural skill among the intervention group nurses was 100% (n=21) checking the patient's information, the most frequently "not practiced" skill of the same group was 16 (38.10%, n=8) squeezing dry cotton tampons, and the most frequently "to be corrected" skill was 26 (47.62%) helping the patient to a comfortable position (Table 2).

Table 1.
Distribution of Nurses According to Descriptive Characteristics (n=42)

Introductory features	Girişim grubu (n=21)		Kontrol grubu (n=21)		Toplam (n=42)		Kikare test
	n	%	n	%	n	%	
Gender							
Women	15	71.4	17	81.0	32	76.2	X^2=0.525
Men	6	28.6	4	19.0	10	23.8	*p*=.469
Age range							
19-25	2	9.5	10	47.6	12	28.6	**X^2=7.467**
26-32	7	33.3	4	19.0	11	26.2	***p*=.024***
33 and over	22	57.1	7	33.3	19	45.2	
Age	Ort±ss=34.61±7.94		Ort±ss=29.71±7.49		Ort±ss=32.16±8.02		
Marital status							
Married	14	66.7	13	61.9	27	64.3	X^2= 0.104
Single	7	33.3	8	38.1	15	35.7	*p*=.747
Education status							
Health vocational high school	4	19.0	3	14.3	7	16.7	
Associate degree	7	33.3	5	23.8	12	28.6	X^2= 5.276
Licence	7	33.3	11	61.9	20	47.6	*p*= .153
Master's degree	3	14.3	0	0	3	7.1	
Working year	Ort±ss=12.28±8.21		Ort±ss=8.80±7.22		Ort±ss=10.54±7.84		
Working year range							
0-1 year	3	14.3	4	19.1	7	16.7	X^2= 1.120
2-5 year	2	9.5	4	19.1	6	14.4	*p*=.571
6 years and over	16	76.2	13	61.8	29	68.9	
Clinical study year range							
0-1 year	5	23.8	6	28.6	11	26.2	X^2= 1.543
2-5 year	11	52.3	13	61.9	24	57.1	*p*= .462
6 year and over	5	23.9	2	9.6	7	16.7	
Clinical Study year	Ort±ss=4.23±3.34		Ort±ss=3.38±2.78		Ort±ss=3.80±3.07		
Shift Pattern							
Daytime	5	23.8	7	33.3	12	28.6	X^2= 0.484
Night	2	9.5	2	9.5	4	9.5	*p*=.784
Daytime-night	14	66.7	12	57.1	26	61.9	
Number of Daily Injections							
2-5	12	57.2	7	33.4	19	45.1	X^2= 4.887
6-10	8	38.1	8	38.1	16	38.1	*p*=.087
11 and over	1	4.8	6	28.5	7	16.8	
Number of Daily Injections	Ort±ss=6.66±3.30		Ort±ss=9.52±5.78		Ort±ss=8.09±4.87		
Status of receiving in-service training							
Yes	9	42.9	8	38.1	17	40.5	X^2= 0.099
No	12	57.1	13	61.9	25	59.5	*p*=.753

Skills of the nurses in the control group regarding subcutaneous heparin injection practice after training and 1 month after training

When the process skills that the control group nurses "practiced" the most after the training were examined, the 1st skill, "The patient's name, medication card and application information are checked" was 95.24% (n=20); the 16th skill, "The dry cotton tampon is squeezed between the ring and pinky finger of the immobilized hand" was 33.33% (n=7); the 29th skill, "The materials used are removed appropriately" was 57.14% (n=12), was observed as "needing correction" (Table 3).

Table 2.
Distribution of Skill Percentages of Nurses in the Intervention Group Regarding Subcutaneous Heparin Injection Practice After Training and 1 Month After Training (n=21)

Subcutaneous skills list	Control Group					
	Post Training			Post Training		
	Applied	Not applied	Must be corrected	Applied	Not applied	Must be corrected
	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)
Skill 1	21(100)	0(0)	0(0)	21(100)	0(0)	0(0)
Skill 2	12(57.14)	1(4.76)	8(38.10)	20(95.24)	1(4.76)	0(0)
Skill 3	16(76.19)	0(0)	5(23.81)	20(95.24)	0(0)	1(4.76)
Skill 4	20(95.24)	0(0)	1(4.76)	16(76.19)	5(23.81)	0(0)
Skill 5	12(57.14)	7(33.33)	2(9.52)	15(71.43)	3(14.29)	3(14.29)
Skill 6	10(47.62)	7(33.33)	4(19.05)	14(66.67)	4(19.05)	3(14.29)
Skill 7	15(71.43)	1(4.76)	5(23.81)	14(66.67)	6(28.57)	1(4.76)
Skill 8	13(61.90)	1(4.76)	7(33.33)	15(71.43)	6(28.57)	0(0)
Skill 9	12(57.14)	1(4.76)	8(38.10)	16(76.19)	3(14.29)	2(9.52)
Skill 10	18(85.71)	1(4.76)	2(9.52)	13(61.90)	6(28.57)	2(9.52)
Skill 11	18(85.71)	2(9.52)	1(4.76)	17(80.95)	2 (9.52)	2(9.52)
Skill 12	14(66.67)	2(9.52)	5(23.81)	16(76.19)	2 (9.52)	3(14.29)
Skill 13	19(90.48)	1(4.76)	1(4.76)	14(66.67)	6(28.57)	1(4.76)
Skill 14	20(95.24)	0(0)	1(4.76)	14(66.67)	5(23.81)	2(9.52)
Skill 15	18(85.71)	2(9.52)	1(4.76)	17(80.95)	4(19.05)	0(0)
Skill 16	7(33.33)	8(38.10)	6(28.57)	14(66.67)	3(14.29)	4(19.05)
Skill 17	12(57.14)	0(0)	9(42.86)	18(85.71)	3(14.29)	0(0)
Skill 18	16(76.19)	0(0)	5(23.81)	17(80.95)	1(4.76)	3(14.29)
Skill 19	20(95.24)	0(0)	1(4.76)	16(76.19)	4(19.05)	1(4.76)
Skill 20	21(100)	0(0)	0(0)	13(61.90)	4(19.05)	4(19.05)
Skill 21	17(80.95)	1(4.76)	3(14.29)	16(76.19)	3(14.29)	2(9.52)
Skill 22	20(95.24)	0(0)	1(4.76)	16(76.19)	3(14.29)	2(9.52)
Skill 23	17(80.95)	1(4.76)	3(14.29)	20(95.24)	1(4.76)	0(0)
Skill 24	14(66.67)	0(0)	7(33.33)	15(71.43)	3(14.29)	3(14.29)
Skill 25	14(66.67)	0(0)	7(33.33)	12(57.14)	4(19.05)	5(23.81)
Skill 26	6(28.57)	5(23.81)	10(47.62)	14(66.67)	5(23.81)	2(9.52)
Skill 27	11(52.38)	3(14.29)	7(33.33)	10(47.62)	5(23.81)	6(28.57)
Skill 28	14(66.67)	3(14.29)	4(19.05)	9(42.86)	5(23.81)	7(33.33)
Skill 29	16(76.19)	1(4.76)	4(19.05)	12(57.14)	5(23.81)	4(19.05)
Skill 30	16(76.19)	0(0)	5(23.81)	13(61.90)	4(19.05)	4(19.05)
Skill 31	16(76.19)	1(4.76)	4(19.05)	14(66.67)	2(9.52)	5(23.81)
Skill 32	18(85.71)	1(4.76)	2(9.52)	15(71.43)	2(9.52)	4(19.05)
Skill 33	13(61.90)	1(4.76)	7(33.33)	15(71.43)	1(4.76)	5(23.81)

Knowledge scores of nurses about subcutaneous heparin injection application before and after training

In Table 4, the knowledge scores of nurses on subcutaneous heparin injection were compared before and after training. A significant difference was found between the intervention and control groups before training (Z=-2.231, *p*=.026), with the control group scoring higher. Post-training scores also showed a significant difference (Z=-5.590, *p*<.001), which continued one month after training. (Z=-4.712, *p*<.001).

There is a statistically significant difference between the mean knowledge scores of the intervention group nurses before, after and 1 month after the training (X2=41.518, *p*<.001). A significant difference was also observed between the scores after the training and 1 month later (*p*<.05). In addition, the difference between the scores measured immediately after the training and 1 month later was also statistically significant (*p*<.05).

Table 3.
Distribution of Skill Percentages of Nurses in the Control Group Regarding Subcutaneous Heparin Injection Practice After Training and 1 Month After Training (n=21)

Subcutaneous skills list	Control Group					
	Post Training			1 month after the training		
	Applied	Not applied	Must be corrected	Applied	Not applied	Must be corrected
	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)
Skill 1	20(95.24)	1(4.76)	0(0.00)	20(95.24)	0(0.00)	1(4.76)
Skill 2	19(90.48)	0(0.00)	2(9.52)	19(90.48)	1(4.76)	1(4.76)
Skill 3	17(80.95)	1(4.76)	3(14.29)	16(76.19)	0(0.00)	5(23.81)
Skill 4	15(71.43)	0(0.00)	6(28.57)	12(57.14)	1(4.76)	8(38.10)
Skill 5	10(47.62)	4(19.05)	7(33.33)	10(47.62)	2(9.52)	9(42.86)
Skill 6	9(42.86)	5(23.81)	7(33.33)	9(42.86)	4(19.05)	8(38.10)
Skill 7	9(42.86)	4(19.05)	8(38.10)	7(33.33)	4(19.05)	10(47.62)
Skill 8	12(57.14)	0 (0.00)	9(42.86)	7(33.33)	7(33.33)	7(33.33)
Skill 9	9(42.86)	2 (9.52)	10(47.62)	9(42.86)	5(23.81)	7(33.33)
Skill 10	8(38.10)	4(19.05)	9(42.86)	8(38.10)	6(28.57)	7(33.33)
Skill 11	12(57.14)	3(14.29)	6(28.57)	11(52.38)	5(23.81)	5(23.81)
Skill 12	10(47.62)	4(19.05)	7(33.33)	10(47.62)	6(28.57)	5(23.81)
Skill 13	7(33.33)	6(28.57)	8(38.10)	15(71.43)	3(14.29)	3(14.29)
Skill 14	10(47.62)	1(4.76)	10(47.62)	12(57.14)	6(28.57)	3(14.29)
Skill 15	7(33.33)	6(28.57)	8(38.10)	11(52.38)	2(9.52)	8(38.10)
Skill 16	7(33.33)	7(33.33)	7(33.33)	7(33.33)	6(28.57)	8(38.10)
Skill 17	6(28.57)	6(28.57)	9(42.86)	6(28.57)	7(33.33)	8(38.10)
Skill 18	7(33.33)	6(28.57)	8(38.10)	5(23.81)	3(14.29)	13(61.90)
Skill 19	11(52.38)	5(23.81)	5(23.81)	6(28.57)	4(19.05)	11(52.38)
Skill 20	8(38.10)	6(28.57)	7(33.33)	6(28.57)	2(9.52)	13(61.90)
Skill 21	6(28.57)	5(23.81)	10(47.62)	6(28.57)	2(9.52)	13(61.90)
Skill 22	12(57.14)	3(14.29)	6(28.57)	9(42.86)	4(19.05)	8(38.10)
Skill 23	9(42.86)	4(19.05)	8(38.10)	8(38.10)	7(33.33)	6(28.57)
Skill 24	10(47.62)	4(19.05)	7(33.33)	9(42.86)	5(23.81)	7(33.33)
Skill 25	9(42.86)	3(14.29)	9(42.86)	11(52.38)	3(14.29)	7(33.33)
Skill 26	9(42.86)	2(9.52)	10(47.62)	13(61.90)	1(4.76)	7(33.33)
Skill 27	7(33.33)	3(14.29)	11(52.38)	8(38.10)	4(19.05)	7(33.33)
Skill 28	4(19.05)	5(23.81)	12(57.14)	8(38.10)	8(38.10)	9(42.86)
Skill 29	7(33.33)	2(9.52)	12(57.14)	10(47.62)	3(14.29)	3(14.29)
Skill 30	9(42.86)	3(14.29)	9(42.86)	13(61.90)	4(19.05)	4(19.05)
Skill 31	15(71.43)	1(4.76)	5(23.81)	18(85.71)	1(4.76)	2(9.52)
Skill 32	17(80.95)	2(9.52)	2 (9.52)	15(71.43)	2(9.52)	4(19.05)
Skill 33	14(66.67)	0(0.00)	7(33.33)	16(76.19)	1(4.76)	4(19.05)

There is a statistically significant difference between the mean knowledge scores of the control group nurses before, after and 1 month after the training (X2=13.727, *p*=.001). A significant increase was observed in the scores after the training and after 1 month (*p*<.05).

Discussion

This study was conducted with 42 nurses in a state hospital and the knowledge and skills of the intervention and control group nurses about SC heparin injection were compared before and after the training.

Skills of nurses in the intervention and control groups regarding subcutaneous heparin injection administration after training and 1 month after training

Nursing requires a combination of theoretical knowledge and practical skills (Atabek Aştı & Karadağ, 2012; Sexson, Lindauer & Harvath, 2017).

Table 4.
Comparison of Nurses' Knowledge Scores Regarding Subcutaneous Heparin Injection Practice Before and After Training (n=42)

Training times	Enterprise group (n=21)		Control group (n=21)		Mann Whitney U test
	Mean ± SD	Min-Maks	Mean ± SD	Min-Maks	
Pre-training pre-test (a)	40.71 ± 8.106	20-50	45.35 ± 4.067	45-50	Z=-2.231 *p*=.026*
Post-training post-test (b)	83.80 ± 8.201	70-100	50.00 ± 5.244	50-55	Z= -5.590 *p*=.000*
Retention test 1 month after the training (c)	66.19 ± 7.567	55-80	53.57 ± 5.277	55-60	Z= -4.712 *p*=.000*
Friedman test. X^2	X^2=41.518, *p*=.000*		X^2=13.727, *p*=.001*		
Wilcoxon test*	a<b. c<b. a<c		a<c<b		

p<0.05, SD: Standart Deviation

In our study, the post-training skills of intervention and control group nurses for SC heparin injection were compared. In accordance with the results of similar studies in the literature, most of the nurses in the intervention group successfully performed skill 1 "Patient's name, drug card, and administration details checked" and skill 20 "The needle angle is applied appropriately" after training and one month later (Akpınar et al., 2010; Turan et al., 2019). These skills are important for all injections and the competence of nurses has increased. This is due to habits, trainings and familiarity with the region. In the intervention group, the most frequently observed "did not apply" skills were 16 "The dry cotton tampon is squeezed between the ring and pinky finger of the inactive hand", 5 "hand washing" and 6 "identity check". One month after the training, the number of non-implementers decreased by half. In addition, the skills that "needed to be corrected" were 26 "helping the patient to a comfortable position", 2 "diagnosing the medication history" and 9 "verifying the medication card", and more than half of the misapplicators showed a positive change as "applied" after the training. In Kazan & Görgülü (2009) study, nurses did not wait for the alcohol to dry while wiping the injection site with alcohol cotton wool. The rate of using dry cotton tampons during needle removal was low between 10% (2nd observation) and 23.3% (3rd observation). Recommendations such as dry cotton tampon and cold application after injection should be paid attention (Chan, 2001).

After the training and one month later, the nurses in the control group mostly applied the process of "Checking the patient's name, medication card, name of the drug, dose, route of administration and time upon physician's order". Preparation of medicines according to 10 correct principles is the basic skill of the nurse. In Turaç and Ünsal's (2018) study, 46% of nurses who did not receive training reported that they checked the accuracy of the medication. This shows that the drug preparation and administration skills of nurses after training are more controlled.

While the number of "not applied" skills 17 "Carefully unsheathe the syringe", 23 "After injection, the needle is left in the tissue for 10 seconds" and 28 "The ready injector is disposed of in the sharps waste bin" was low in the control group nurses after the training, an increase and negative change was observed in the non-application of these skills one month after the training. In the study of Turaç and Ünsal (2018), the rate of nurses throwing the piston and needle into appropriate waste bins in SC heparin administration was found to be 8.4%, applying the drug slowly 92.4%, and entering the tissue at a right angle 50.0%.

After the training, 57% of the nurses in the control group identified "The ready injector is disposed of in the sharps waste box" and "The materials used are removed appropriately" as the most "correctable" skills. One month after the training, there was a decrease in the number of nurses who applied these skills and an increase in those who said "applied" or "not applied". Sharps should be stored in closed waste bins to prevent the risk of injury and infection. The most frequently "to be corrected" skills were identified as 18, 20 and 21. Turaç & Ünsal (2018) and Durusoy & Dal (2013) found a lack of knowledge in these skills. These deficiencies negatively affect the quality of patient care and lead to complications. SC heparin injection should be performed according to standard steps.

Knowledge scores of nurses about subcutaneous heparin injection application before and after training

In this study, it was aimed to increase the level of awareness of nurses' knowledge and skills in the application of SC heparin injection, to improve them in training processes and to eliminate the differences in practice. The training process enabled the active participation of nurses, enabling one-to-one practice and exchange of information.

The mean knowledge scores of the intervention group nurses were higher than those of the control group before, after, and one month post-training. Although knowledge increased after training, it decreased slightly after one month due to forgetting and old habits. Training effectively

improved nurses' knowledge of SC heparin injection, while the control group scored lower. The evaluations raised awareness and were evident in post-training measurements.

In this study, knowledge scores increased significantly after the planned training given to nurses. Similar studies have also shown that nurses' knowledge scores increased after training (Kazan & Görgülü, 2009; Durusoy & Dal, 2013; D'souza Sr, 2015; Turaç & Ünsal, 2018). The results reveal that the training process increases knowledge, eliminates practice differences and ensures active participation of nurses. It also emphasises the importance of information exchange.

Conclusion and Recommendations

In this study, it was found that planned training given to nurses to overcome their lack of knowledge in the application of subcutaneous heparin injection increased their knowledge and skills. It is recommended that long-term or periodic in-service trainings with innovative methods (simulation, web-based, face-to-face individual/group work, brochure preparation, etc.) should be carried out for nurses to apply SC heparin injection as standard.

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Informed Consent: Once the nurses and patients who had been informed about the study and had volunteered to participate in it had been informed, written consent was obtained using informed consent forms.
Peer-review: Externally peer-reviewed.
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Hasta Onamı: Araştırma hakkında bilgilendirilen ve araştırmaya katılmaya gönüllü olan hemşirelere ve hastalara bilgi verildikten sonra Bilgilendirilmiş Gönüllü Olur Formları kullanılarak yazılı izin alındı.
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Yazar Katkıları: Konsept - TSM, SDD; Tasarım - TSM, SDD; Denetim - TSM, SDD; Kaynaklar - TSM, SDD; Malzemeler - TSM, SDD; Veri Toplama ve/veya İşleme - SDD; Analiz ve/veya Yorum - TSM, SDD; Literatür Taraması - TSM, SDD; Yazma - TSM, SDD; Eleştirel İnceleme - TSM, SDD.
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Genişletilmiş Özet

Bu çalışma, hemşirelerin SC enjeksiyon uygulaması konusunda bilgi düzeylerini belirlemek ve eksikliklerine yönelik bilgi ve becerilerini artırmak için verilen eğitimin etkinliğini incelemek amacıyla yapılmıştır.

Çalışmamız Ağustos 2019- Eylül 2020 tarihleri arasında yapılmış, ön test-son test düzeninde yarı deneysel, yüzyüze eğitim yöntemi kullanılmıştır. Araştırmanın evrenini Bir Devlet Hastanesi' nde çalışan 190 hemşire oluşturmuştur. Örnekleme; Klinikte bakım ve tedaviden sorumlu hemşireler, SC enjeksiyon uygulamasının yapıldığı birimlerde çalışan, düşük molekül ağırlıklı SC heparin enjeksiyonu uygulayan, araştırmayı kabul eden hemşireler dahil edilmiştir.

Hemşirelerin sosyodemografik ve mesleki özelliklerni belirlemek amacıyla "Hemşirelere Yönelik Birey Tanılama Formu" kullanılmıştır. Hemşirelerin SC Heparin enkesiyon uygulama esnasında gözlemlenmesi amacıyla oluşturulan "Hemşirelerin Heparinli SC Enjeksiyon uygulamasına İlişkin Beceri Önermelerini İçeren Kontrol Listesi'' formu için uzman görüşü alınmış ve 10 hemşire ile pilot çalışma yapılmıştır. Veriler hemşirelerin uygun oldukları saatlere göre öncelikle hemşirelere yönelik birey tanılama formu ve SC Enjeksiyon Uygulamasına İlişkin Bilgi Önermelerini İçeren Soru Formu ile toplanmıştır. Bilgi önermelerini içeren soru formuna göre bilgi puanı %50'nin üzerinde eksiklik olan hemşireler araştırmaya alınmıştır. Kura yöntemi ile hemşireler müdahale ve kontrol grubu olarak ikiye ayrılmıştır. Hemşireler SC enjeksiyon uygulama esnasında araştırmacılar tarafından gözlenecekleri belirtilerek açık gözlem ve iki gözlemci ile yazılı onam alınarak yapılmıştır.

Kura sonucunda belirlenen müdahale grubuna anlatım, soru-cevap, bilgilendirici broşür, kol maketi üzerinde demonstrasyon, PowerPoint eğitim materyali ile yaklaşık 30-45 dk' lık eğitim sunumu uygulanıştır. Eğitimden sonra hemşireler kol maketi üzerinde enjeksiyon uygulamalarını gerçekleştirirken araştırmacı "SC Enjeksiyon uygulamasına ilişkin beceri önermelerini içeren kontrol listesi" listesini doldurmuştur. Eğitimden hemen sonra "SC Enjeksiyon uygulamasına ilişkin bilgi önermelerini içeren soru formu" uygulanmıştır. Üçüncü gözlemde eğitimin hemşirelerin bilgi ve becerilerini nasıl etkilediğini belirlemek amacıyla eğitimden sonraki 15-30 gün içerisinde düşük molekül ağırlıklı heparin ilaç tedavisi alan hastalarda hemşireler SC enjeksiyon uygulaması esnasında gözlemlenerek "SC Enjeksiyon uygulamasına ilişkin beceri önermelerini içeren kontrol listesi" doldurulduktan sonra "SC Enjeksiyon uygulamasına ilişkin bilgi önermelerini içeren soru formu" gözlemci tarafından tamamlanmıştır.

Kontrol grubu: Kura ile belirlenen bu gruba ikinci izlemde "SC Enjeksiyon Uygulamasına İlişkin Bilgi Önermelerini İçeren Soru Formu" uygulandıktan sonra hemşireler birebir kol maketi ile SC heparin uygulaması yaparken gözlemci tarafından "SC Enjeksiyon Uygulamasına İlişkin Beceri Önermelerini İçeren Değerlendirme Formu" doldurulduu. Sonraki izlemden 15-30 gün içerisinde heprarin tedavisi alan hastalara hemşireler SC enjeksiyon uygulaması yaparken araştırmacı ile birlikte ikinci gözlemci aracılığıyla gözlemlenerek "SC Enjeksiyon Uygulamasına İlişkin Beceri Önermelerini İçeren Kontrol Listesi" listesi ve "SC Enjeksiyon Uygulamasına İlişkin Bilgi Önermelerini İçeren Soru Formu" doldurulmuştur. Grublara eşit uygulamalar yapılması gerektiğinden hemşirelere SC enjeksiyon uygulamasına yönelik eğitim sunumu yapılmıştır.

Hemşirelerin %45,2'si (n=19) 33 yaş ve üzeri yaş grubundadır. Girişim grubunda yer alan hemşirelerin %33,3'ü (n=7), kontrol grubunda yer alan hemşirelerin %61,9'u (n=11) lisans mezunu olduğunu belirtti. Yapılan ki kare analizine göre, müdahale ve kontrol gruplarındaki hemşirelerin yaş grupları, medeni, öğrenim, vardiya durumları, meslekte ve klinikte çalışma yılı, günlük enjeksiyon sayısı ve hizmet içi eğitim alma açısından benzer olduğu bulunmuştur. (p>0,05).

Girişim grubundaki hemşirelerin eğitim sonrası ve eğitimden 1 ay sonrası subkutan heparin enjeksiyon uygulamasına göre girişim grubu hemşirelerin en çok "uyguladı'' olarak gözlemlenen işlem becerisi; beceri 1 "Hekim istemi ile hastanın adı soyadı, ilaç kartı, ilacın ismi, dozu, uygulama yolu, uygulama zamanı kontrol edilir.'', eğitimden 1 ay sonrasında en çok "uyguladı'' olarak gözlemlenen işlem becerisi; beceri 1 "Hekim istemi ile hastanın adı soyadı, ilaç kartı, ilacın ismi, dozu, uygulama yolu, uygulama zamanı kontrol edilir.'' %100 (n=21), eğitim sonrası en çok "uygulamadı'' olarak gözlemlenen işlem becerisi; beceri 16 "Kuru pamuk tampon aktif olmayan elin yüzük ve serçe parmağı arasına sıkıştırılır.'' %38,10 (n=8), eğitimden 1 ay sonrası en çok "uygulamadı'' olarak gözlemlenen işlem becerisi; beceri 7 "İşlem hastaya açıklanır ve iş birliği sağlanır.'' %28,57 (n=6), eğitim sonrası en çok "düzeltilmeli'' olarak gözlemlenen işlem becerisi; beceri 26 "Enjeksiyondan sonra hastanın rahat bir pozisyona gelmesine yardım edilir." %47,62 (n=10), eğitimden 1 ay sonrası en çok "düzeltilmeli'' olarak gözlemlenen işlem becerisi; beceri 28 "Hasta odasının kapısı veya perde/paravan kapatılır" %33,33 (n=7) olarak saptanmıştır.

Kontrol grubundaki hemşirelerin eğitim sonrası ve eğitimden 1 ay sonrası subkutan heparin enjeksiyon uygulamasına ilişkin becerileri Kontrol grubu hemşirelerin eğitim sonrası en çok "uyguladı'' olarak gözlemlenen işlem becerileri yüzde dağılımları; beceri 1 "Hekim istemi ile hastanın adı soyadı, ilaç kartı, ilacın ismi, dozu, uygulama yolu, uygulama zamanı kontrol edilir.''

%95,24 (n=20), eğitimden 1 ay sonrası en çok “uyguladı’’ olarak gözlemlenen işlem becerisi; beceri 1 “Hekim istemi ile hastanın adı soyadı, ilaç kartı, ilacın ismi, dozu, uygulama yolu, uygulama zamanı kontrol edilir.’’ %95,24 (n=20), eğitim sonrası en çok “uygulamadı’’ olarak gözlemlenen işlem becerisi; beceri 16 ‘‘Kuru pamuk tampon aktif olmayan elin yüzük ve serçe parmağı arasına sıkıştırılır.’’, eğitimden 1 ay sonrası en çok “uygulamadı’’ olarak gözlemlenen işlem becerisi; beceri 28 “Hazır enjektör delicikesici atık kutusuna atılır.”, eğitim sonrası en çok “düzeltilmeli’’ olarak gözlemlenen işlem becerisi; beceri 29 “Kullanılan malzemeler uygun bir şekilde ortamdan kaldırılır.’’ %57,14 (n=12), eğitimden 1 ay sonrası en çok “düzeltilmeli’’ olarak gözlemlenen işlem becerisi; beceri 18 “Hazır enjektör aktif elin başparmağı ile orta ve yüzük parmakları arasında kalem tutar gibi tutulur’’ %61,90 (n=13) olarak saptandı.

Kontrol grubundaki hemşirelerin girişim grubundakilere göre bilgi puanı nın daha yüksek olduğu, Girişim ve kontrol grubundaki hemşirelerin eğitimden 1 ay sonrası bilgi puanları ortalaması arasında istatistiksel olarak anlamlı bir fark olduğu, Girişim grubunun eğitim öncesi, eğitimden hemen sonra ve eğitimden 1 ay sonra ölçülen bilgi puan ortalamaları arasındaki fark istatistiksel olarak anlamlı bulunmuştur (X2=41,518, p=0,000). Bu anlamlılığın eğitim sonrası ve eğitimden 1 ay sonra ölçülen bilgi puan ortalamasının eğitim öncesi bilgi puanları arasında anlamlı yönde bir fark olduğu görüldü.

Hemşirelerin SC enjeksiyon uygulamasına ilişkin bilgi ve becerilerinin incelendiği çalışmada; bilgi ve beceri eksikliği olan hemşirelere verilen eğitimin hemşirelerin bilgisini ve becerisini arttırdığı saptandı. Çalışmamızda müdahale ve kontrol grubundaki hemşirelerin eğitim öncesi bilgi puanları ortalaması arasında, müdahale ve kontrol grubundaki hemşirelerin eğitim sonrası bilgi puanları ortalaması arasında, müdahale ve kontrol grubundaki hemşirelerin eğitimden 1 ay sonrası bilgi puanları ortalaması arasında istatistiksel olarak anlamlı bir fark bulunduğu görülmüştür. Müdahale grubu eğitim zamanlarına göre bilgi puan ortalamalarına bakıldığında eğitim öncesi bilgi puanının eğitim sonrası ve eğitimden 1 ay sonrası bilgi puanından daha düşük olduğu görüldü. Verilen eğitimin hemşirelerin SC heparin enjeksiyon uygulamasındaki bilgi seviyelerini artırdığı görülmektedir.