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Determination of the Knowledge Levels of Nurses Regarding Central Venous Catheter Care

Pediyatri Hemşirelerinin Santral Venöz Kateter Bakımı Konusunda Bilgi Düzeylerinin Belirlenmesi

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Abstract

Introduction: It is important that pediatric nurses have sufficient knowledge in the prevention of central catheter-related blood circulation infections. This study was carried out to determine knowledge levels of the nurses, who were working in pediatric clinics, regarding central venous catheter care.

Methods: The universe of the study was composed of 118 nurses, who were working in pediatric clinic of a public hospital (n=50) and a training hospital (n=68) between May-June 2019. No sample was selected; and 88 nurses, who were eligible for the sample and study criteria and approved to participate during the dates of data collection (May-June 2019) were included in the study. 75% of the universe was reached. Personal information form for the identification of demographic characteristics and working lives of the nurses and the form for the knowledge levels of the nurses regarding central venous catheter care were used to collect data.

Results: At the end of statistical assessment, central venous catheter care mean score of nurses was found to be 8.35+2.36 (0-12). In addition, it was determined that no significant differences were found between central venous catheter scores of the nurses based on age, sex, marital status, working institution, working department, working year and their states of providing central venous catheter care (p>0.05). A significant difference was detected between nurses' states of having knowledge and education regarding central venous catheter and their central venous catheter scores (p<0.05).

Conclusion: It was found that the knowledge points of the nurses for central venous catheter care were insufficient. It is recommended to increase in-service training in line with the protocol/procedure/instructions regarding central venous catheter care.

Keywords: Central venous catheter, nursing care, knowledge level, pediatric nurse

Öz

Giriş: Çocuk hemşirelerinin santral venöz kateter ilişkili kan dolaşımı enfeksiyonların önlenmesinde yeterli bilgi düzeyine sahip olması önemlidir. Bu araştırma, çocuk kliniklerinde çalışan hemşirelerin santral venöz kateter bakımı ile ilgili bilgi düzeylerinin saptanması amacıyla gerçekleştirildi.

Yöntemler: Araştırmanın evrenini Mayıs-Haziran 2019 tarihleri arasında bir üniversite hastanesi (n=68) ve devlet hastanesinin (n=50) çocuk kliniklerinde görev yapan 118 hemşire oluşturmuştur. Çalışmada örneklem seçimine gidilmeyip, çalışmanın verilerinin toplandığı tarihlerde (Mayıs-Haziran 2019) çalışmanın örneklem ve uygulanma ölçütlerine uygun olan ve çalışmaya katılmayı kabul eden 88 hemşire ile çalışılmıştır. Verilerin toplanmasında hemşirelerin demografik özellikleri ve iş yaşamıyla ilgili özelliklerini belirlemeye yönelik kişisel bilgiler formu ve hemşirelerin santral venöz kateter bakımına ilişkin bilgi düzeyi formu kullanılmıştır.

Bulgular: Yapılan istatistiksel değerlendirme sonucunda hemşirelerin santral venöz kateter bakımı puan ortalaması 8,35+2,36 (0-12) olarak bulunmuştur. Ayrıca hemşirelerin santral venöz kateter bakımı bilgi puan ortalamalarının hemşirelerin yaş, cinsiyet, medeni durum, çalıştıkları kurum, çalıştıkları bölüm, çalıştıkları yıl ve santral venöz kateter bakımı vermiş olma durumlarına göre anlamlı bir farklılık göstermediği belirlenmiştir (p>0,05). Hemşirelerin santral venöz kateter hakkında bilgi alma ve eğitim durumlarına göre santral venöz kateter bakımı bilgi puan ortalamaları arasında anlamlı farklılık tespit edilmiştir (p<0,05).

Sonuç: Hemşirelerin santral venöz kateter bakımı bilgi puan ortalamalarının yetersiz olduğu bulunmuştur. Santral venöz kateter bakımı ile ilgili protokol/prosedür/talimatlara uygun şekilde bakım verilmesi doğrultusunda hizmet içi eğitimlerin artırılması önerilmektedir.

Anahtar Kelimeler: Santral venöz kateter, hemşirelik bakımı, bilgi düzeyi, çocuk hemşiresi

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Introduction

Central venous catheterization, which is an important part of vital support in intensive care units, is the procedure of placing a catheter in a vein that directly joins the heart.[1,2] Central venous catheters (CVCs) are accepted as one of the most basic applications of modern clinical treatment and are the most commonly used catheters after peripheral venous catheters.[3] CVC is frequently used for fluid and drug therapy, transfusion of blood and blood products, total parenteral nutrition, extracorporeal treatment application such as hemodialysis and plasmapheresis, and monitoring of hemodynamic parameters.[4-6] Due to these advantages it provides, the use of CVC in pediatric patients has increased considerably in recent years.[4,7] In addition to the benefits it provides, CVC has its own complications, such as bleeding, arterial and nerve injuries, pneumothorax, hemothorax, thrombosis, and embolism, as in every medical intervention.[5,6] However, among these complications, central catheter-related bloodstream infections (CR-BSIs) are among the major causes of healthcare-associated infections in pediatric patients, and they are also an important problem that threatens patient safety.[4,8] The morbidity and mortality rates of CR-BSI are quite high. In studies conducted with pediatric patients, the CR-BSI was reported to be between 0.5 and 4.53 per 1000 catheter days. [5,6,9,10] In a study performed by Tsuchida et al.,[11] it was determined that it decreased from 4.0 to 1.1 per 1000 catheter days with the measures taken by nurses for the problems associated with catheter care. In studies conducted at the national and international level, it was determined that CR-BSI increased the mortality rate in pediatric patients by 1-1.5% and prolonged the length of hospitalization.[4,6,10,12,13]

It is important for pediatric nurses to have sufficient knowledge in the prevention of CR-BSIs. However, in studies conducted on the subject, it was concluded that the knowledge level of nurses on adult CVC care was insufficient and they should be trained on this subject.[14,15] In addition, when the literature was reviewed, it was determined that there were few studies evaluating the knowledge levels of nurses about CVC care, and that these studies were conducted with nurses working in the adult intensive care unit.[2,16,17] No study was found in Turkey that evaluated the knowledge level of pediatric nurses about CVC care. The aim of this study was to determine the knowledge level of pediatric nurses about CVC care. It is important to determine the knowledge level of nurses about CVC care and also to reveal which variables affect the level of CVC knowledge positively or negatively in terms of determining the steps to be taken in order to improve the knowledge level of nurses.

Research Questions

1) How do pediatric nurses perform CVC care?

2) Have pediatric nurses been given information about CVC?

3) Do the socio-demographic characteristics of pediatric nurses affect their CVC care knowledge scores?

4) Do the work life characteristics of pediatric nurses affect their CVC care knowledge scores?

Materials and Methods

The population of this descriptive-comparative study consisted of a total of 118 nurses working in the pediatric clinics of a university hospital (n=68) and a state hospital (n=50) in a city center between May and June 2019. Sample selection was not made in the study, and 88 nurses who agreed to participate in the study and who were suitable for the sampling and application criteria of the study at the time of data collection (May-June 2019) were studied. The rate of participation in the research was 75.0%. Thirty nurses who refused to participate in the study, who were on leave between the specified dates and who could not be reached were excluded from the study.

The "personal information form" to determine the socio-demographic and work life-related characteristics of nurses and the "knowledge level form for nurses on CVC care" to determine the knowledge level of nurses about CVC care were used while collecting data in the study. Before starting the application, the nurses were informed about the purpose of the study by the researcher and informed verbal and written consent was obtained, stating that their participation was on a voluntary basis. After informing the volunteer nurses about the study by the researchers, an introductory information form and a nurses' knowledge level form on CVC care were given and the participants were asked to fill in the questionnaires themselves when appropriate. The application time of the data collection forms required an average of 10 minutes. Questionnaires filled in by the nurses were collected by the researchers by visiting pediatric clinics over a two-month period.

Personal Information Form

The form created by the researcher aims to determine the characteristics of nurses such as age, gender, marital status, educational status, institution and clinic, working time in this clinic, obtaining information about CVC and its way, giving CVC care in the institution where they work and how they practice.

Knowledge Level Form for Nurses on CVC Care

In order to determine the knowledge level of nurses on CVC care, the researcher created this form by using the

2019 National Vascular Access Management Guideline as a source.[18] In order to determine the principles of safe insertion, management and removal of venous catheters (peripheral and central) in health institutions and organizations in our country, the "National Vascular Access Management Guideline 2019" was cooperatively created by the Turkish Internal Medicine Specialization Association, Turkish Society of Hospital Infections and Control, Turkish Society of Intensive Care, Turkish Anesthesiology and Reanimation Society, Oncology Nursing Society, Turkish Society of Intensive Care Nurses, Turkish Nurses Association and Association of Neonatal Nursing Association in the light of current literature.

The guideline consists of three parts. The third part of the guideline is about CVCs and includes recommendations on central venous catheter indications, selection, placement and insertion, dressing and clothing change, intravenous flushing/locking, management of various complications, especially central venous catheter-related bloodstream infections. The guideline includes recommendations for pediatric patients.

The Knowledge Level Form for Nurses on CVC Care consists of 13 items. Each item in the form can be answered as "correct", "wrong" and "no idea". The scores from the items are obtained by coding the answers as 1 (for correct answers) and 0 (for answers stated as wrong and no idea). The scores to be taken from the form range from 0 to 13. The increase in the scores obtained from the information form indicates that the knowledge levels of the nurses increase. For the evaluation of the form, it was sent to 15 specialists in the fields of pediatric nursing, pediatrics, pediatric intensive care and hospital infections, and feedback was received from 10 specialists. The form was finalized in line with the suggestions received from the specialists. The preliminary application of the study was carried out in April 2019 with 10 nurses working in the general intensive care and general surgery clinics of the state hospital in the city center, where the research was conducted. As a result of the preliminary application, the opinions of the participants were taken and no changes were made on the questionnaire since it was determined that the questions were understandable and explanatory.

Ethical approval (dated 30.04.2019 and numbered 564) was obtained from the Bülent Ecevit University Human Research Ethics Committee in the province where the research was conducted. In addition, legal permission was obtained from the hospital administrations for the study. The nurses were informed about the purpose of the study and the participants were included in the study after their consent was obtained in line with the principle of willingness and voluntariness. The nurses were informed that they should not write their names on the questionnaire and that the data obtained would be used for scientific purposes.

Statistical Analysis

SPSS (IBM, version 22.0, Chicago, IL) statistical software was used in the research. Descriptive statistics such as frequency, percentage, arithmetic mean and standard deviation were used in the study. The Kolmogrov-Smirnov (K-S) test (n=88), skewness and kurtosis coefficients and Z-scores were examined to determine whether the scores obtained from the study exhibited a normal distribution. In the study, it was seen that the kurtosis value was above +1, the K-S test scores were below 0.05, and the Z-scores were above +1.96. In addition, due to the low number of individuals in the categories (n<30) in the groups whose scores would be compared in line with the research questions, the Mann-Whitney U test for Independent Samples was used to compare the difference between the averages of two independent groups from non-parametric statistics in the study. The Kruskall-Wallis H test was used to compare the averages of more than two groups. The Mann-Whitney U test with Benferroni correction was used to determine which group the differences originated from. The results were evaluated within the 95% confidence interval, and the $p<0.05$ level was considered significant.

Results

It was seen that 54.5% of the nurses participating in the research were between the ages of 26-33 years, 94.3% were women, 60.0% were married, and 63.6% had undergraduate degree. It was detected that 55.7% of the nurses participating in the research were working in the pediatric units of a university hospital, 34.1% in the neonatal intensive care unit, 40.9% of them had been working for more than 5 years. 48.9% of the nurses got information on CVC, 55.8% gained this knowledge through in-service training, 58.0% did not give care for patients with CVC, and 59.5% of the caregivers stated that they provided care in accordance with the CVC-related protocol of the working place.

The scores obtained from the form to determine the knowledge level of nurses about CVC care range from 0 to 13. When the scores of the nurses obtained from the questionnaire were examined, it was found that the minimum score was 0, the maximum score was 12, and the mean score was 8.35±2.36 (Table 1).

It was revealed that the mean knowledge scores of nurses on CVC care differed according to their educational status ($p<0.05$) (Table 2). According to the results of the Mann-Whitney U test conducted to determine the difference between the groups,

Table 1. Mean knowledge scores on CVC care

	Min.	Max.	Arithmetic avg.	SD
CVC knowledge level	0	12	8.35	2.36

CVC: Central venous catheter, SD: Standard deviation

it was found that the mean CVC knowledge score for CVC care was significantly higher for nurses who had associate, undergraduate and graduate degrees compared to those who graduated from health vocational high school ($p<0.05$) (Table 2). It was observed that the mean knowledge scores of nurses on CVC care differed according to their status of getting information about CVC ($p<0.05$) (Table 3). Accordingly, it was seen that the mean knowledge score for CVC care was significantly higher in nurses

who received information about CVC than those who did not. In our study, no significant difference was found between the nurses' CVC scores, age, gender, marital status, institution, department, duration of working, and having provided CVC care ($p>0.05$) (Tables 2, 3).

In Table 4, when the percentages of the responses "correct", "wrong", and "no idea" about the knowledge level of nurses about CVC were examined, it was found that the items most correctly known by the nurses were 1st item (93.2%), which aimed at ensuring hand hygiene, and 5th item (93.2%) and 6th item (93.2%) about changing the cover and dressing of the catheter insertion site. On the other hand, it was observed that the items that were known at the lowest rate were 10th item (12.5%) about solutions used in catheter flushing in newborns, 11th item (30.7%) about the supply of blood and blood components from CVC and 13th item (31.8%) about topical creams used during catheter insertion or maintenance in the umbilical region.

Discussion

The CVC method, which has been used successfully in adult patients for a long time, is increasingly being used in pediatric patients as well. The most serious complication of CVCs is

Table 2. Comparison of mean knowledge scores on CVC care according to some socio-demographic characteristics of nurses

Characteristics	Variables (n)	Mean + SD	Median (Min-max)	Test stat.	p
Age groups	18-25 years (21)	8.33+2.59	9 (0-12)	X^2=1.703	0.63[1]
	26-33 years (48)	8.37+2.40	9 (1-12)		
	34-41 years (12)	8.66+2.42	9 (4-12)		
	42 years and over (7)	7.7+1.38	7 (6-10)		
Gender	Female (83)	8.42+2.23	9 (1-12)	U=189	736[2]
	Male (5)	7.20+4.20	9 (0-10)		
Educational status (Difference=2,3,4>1)	Health vocational high school (11)	6.45+2.73	6 (1-10)	X^2=**9.773**	**0.02**[1]
	Associate degree (13)	8.76+1.64	9 (6-11)		
	Undergraduate (56)	8.41+2.34	9 (0-12)		
	Graduate (8)	9.87+1.55	10 (7-12)		

[1]X^2 : Kruskall-Wallis H test, [2]U: Mann-Whitney U test, CVC: Central venous catheter, SD: Standard deviation

Table 3. Comparison of mean knowledge scores on CVC care according to some worklife characteristics of nurses

Characteristics	Variables (n)	Mean + SD	Median (Min-max)	Test. stat.	p
Institution	State hospital (39)	8.35+2.33	9 (4-12)	U=932	0.842[2]
	University hospital (49)	8.34+2.36	9 (0-12)		
Clinic	Pediatric emergency (19)	7.94+2.83	9 (1-12)	X^2=4.001	0.40[1]
	Pediatric intensive care (12)	7.66+3.28	9 (0-12)		
	Neonatal intensive care (30)	8.83+2.18	9 (4-12)		
	Pediatrics clinic (18)	7.93+1.56	7.5 (5-10)		
	Pediatric oncology (9)	9.11+1.69	9 (5-11)		
Duration of working	Below 1 year (25)	8.72+2.52	9 (0-12)	X^2=3.516	0.17[1]
	1-5 years (27)	8.62+2.27	9 (4-12)		
	5 years and over (36)	7.88+2.30	8 (1-12)		
Getting information on CVC	Yes (43)	8.97+2.28	9 (0-12)	**U=654.0**	**0.00**[2]
	No (45)	7.75+2.30	8 (1-11)		
Giving care	Yes (37)	8.89+1.95	9 (5-12)	U=769.50	0.13[2]
	No (51)	7.96+2.56	9 (0-12)		

[1]X^2 : Kruskall-Wallis H test, [2]U: Mann-Whitney U test, CVC: Central venous catheter, SD: Standard deviation

Table 4. Comparison of the percentages of nurses' responses to the items in the knowledge level form about CVC care

	Correct		Wrong		No opinion	
	f	%	f	%	f	%
1. "Hand hygiene" must be ensured before and after CVC care. Effective hand hygiene can be achieved by rubbing hands with alcohol-based hand antiseptic until they are dry or by washing with soap and water.	82	93.2*	2	2.3	4	4.5
2. The skin should be cleaned with an antiseptic solution while placing CVC.	79	89.8*	2	2.3	7	8
3. There is insufficient evidence regarding the use of 2% chlorhexidine when providing CVC care in premature infants and children under 2 months of age. Its use is controversial because of the risk of skin irritation and chemical burns.	51	58*	2	2.3	3.5	39.8
4. One of the most important goals of CVC follow-up and nursing care is to prevent catheter-related bloodstream infections.	72	81.8*	6	6.8	10	11.4
5. Changing the dressing and cover of the catheter insertion site should be done at regular intervals (every 2 days if sterile gauze has been used; every 5-7 days if a polyurethane dressing has been used) using aseptic technique, and the date of catheter care and dressing change should be recorded.	82	93.2*	-	-	6	6.8
6. If the cover is damaged, loosened, wet, visibly soiled, or if moisture, drainage fluid/blood is found under the cover, cover is changed immediately.	82	93.2*	1	1.1	5	5.7
7. If there is no sign of infection at the catheter insertion site, there is no need for catheter care.	2	2.3	77	87.5*	9	10.2
8. Two types of covers can be used for catheter care. The first is sterile, transparent, semi-permeable and adhesive polyurethane covers or sterile gauze and covers.	52	59.1*	2	2.3	34	38.6
9. If blood samples are to be collected from central venous catheters, all samples should be taken at once.	37	42*	11	12.5	40	45.5
10. When washing the catheter in newborns, solutions containing preservatives should be used in all washings in order to prevent toxicity.	34	38.6	11	12.5*	43	48.9
11. Infusion sets given blood, blood products, or lipid emulsions from a central venous catheter should be changed within 48 hours.	38	43.2	27	30.7*	23	26.1
12. The use of iodize tincture should be avoided because of its potential harmful effects on the thyroid gland in newborns.	52	59.1*	1	1.1	35	39.8
13. Topical antibiotic creams should be used during catheter insertion or maintenance in the umbilical region.	27	30.7	28	31.8*	33	37.5

Correct answers are marked with *. CVC: Central venous catheter

CR-BSI, which is defined among the "most preventable" infections among nosocomial infections. For this reason, pediatric nurses should be aware of the fact that CR-BSI is preventable, have up-to-date information on the prevention and control of infections that are valid all over the world, and provide the most effective care to patients by reinforcing this knowledge with practice. At this point, it is important that pediatric nurses have sufficient knowledge in the prevention of CR-BSI. The mean CVC knowledge score of the nurses was 41.97±15.31 out of 100 points in the study of Aydoğdu and Akgün[15] performed in 2018 and 6.81±2.1 out of 14 points in the study of Batı and Özyürek.[14] In the study conducted by Mankan and Karakaşıkçı[19] on "Determining the Precautions to be Taken Against Hospital Infections", the knowledge score of nurses about CVC was determined as 63.46 out of 100 points. In the limited number of national and international studies, it was determined that the knowledge level of nurses about CVC care was insufficient.[2,16,20] In the present study, similar to the literature, the knowledge level of pediatric nurses was found to be at an insufficient level (8.35±2.36). The reason for this can be shown as the fact that nearly half of the nurses do not receive course/in-service training on the subject. However, it is emphasized in the literature that it is an important strategy for nurses to receive training on evidence-based current practices for the prevention of CVC-related infections.

In this study, it was found that the CVC knowledge scores of the nurses differed according to their status of getting information on CVC, and the CVC knowledge levels of the nurses who received information about CVC were significantly higher than those of the nurses who did not. This finding is important in terms of that it supports the positive relationship between the knowledge level and education about CVC care in pediatric nurses. In parallel with the findings of the study, it was determined that the CVC knowledge scores of the nurses who received training on CVC care were higher in studies conducted to determine the knowledge level of nurses about CVC care and the factors affecting it.[14,15] In a study conducted by Öztürk et al.[21] with 164 healthcare professionals, the difference between pre- and post-training knowledge levels

(success rate increased from 72.0% to 83%) was found to be statistically significant (p=0.00). In the study of Coopersmith et al.[22] performed to examine the effect of the education program on the reduction of catheter-related infections in the surgical intensive care unit, it was determined that the infection rate decreased from 11.8 to 3.7 in 1000 catheter days and decreased by 66% compared to the pre-training period. As a result, it is seen that the knowledge gained by nurses through congresses, seminars, courses and literature, especially in-service training, is important. In this sense, the findings of our study were found to be compatible with the literature. Considering the results of the study, it is thought that it would be effective to provide pediatric nurses with training on catheter care and evidence-based practices to prevent CR-BSI during orientation training and to repeat in-service trainings or clinical trainings at regular intervals. It is also recommended to closely follow the current guidelines on the subject and update the protocols applied in the clinics.

It is seen that the knowledge levels of nurses about CVC care differ according to their educational status (p<0.05). It was found that the CVC knowledge scores of the nurses who had associate, undergraduate and graduate education degrees were significantly higher than those of the nurses who graduated from health vocational high school. Accordingly, it can be said that the educational status of nurses is an effective factor on their CVC knowledge levels. In the study conducted by Köse et al.,[23] a significant difference was observed between the education level of nurses and their level of knowledge. In a study conducted by Diker[24], it was determined that as the education level of nurses increased, their knowledge scores on preventing hospital infections also increased. The data of the study were found to be compatible with the existing literature. The fact that nurses with undergraduate and graduate degrees attended more courses, congresses, seminars and followed up-to-date information more closely may have been effective.

In our study, it was concluded that the CVC knowledge levels of the nurses did not differ according to the clinic they worked in, but the average score of the nurses working in the pediatric oncology clinic was higher than the nurses working in other units, and the lowest average score was in the nurses working in the pediatric health and diseases clinic. In the study conducted by Batı and Özyürek,[14] which gave similar results with our study, it was reported that there was no statistically significant difference in the knowledge score averages of the nurses according to the quality of the ICU they worked in. Again, in the study conducted by Diker,[24] no significant difference was found in the knowledge scores of nurses to prevent nosocomial infections according to the clinics they worked in. Contrary to these studies, Aydoğdu and Akgün[15] found in their study that there was a statistically significant difference in the knowledge levels of nurses about CVC according to the units they worked in. It is thought that this difference between the studies is due to the fact that Aydoğdu and Akgün[15] included nurses working in the service in the study but in the other studies, they only included nurses working in intensive care units.

The item "Hand hygiene must be ensured before and after CVC care. Effective hand hygiene can be achieved by rubbing hands with alcohol-based hand antiseptic until they are dry or by washing with soap and water" was one of the most correctly answered questions by pediatric nurses with a correct response rate of 93.2%. The easiest and most effective method for infection is to provide hand hygiene. Nurses have a very effective role in preventing possible infection that may develop in patients.[25] In the study of Aydoğdu and Akgün,[15] nurses were asked, "Which hand washing method do you use in patients with CVC?" and 77.2% of them answered the question correctly. In studies conducted to determine handwashing habits among healthcare workers, nurses' handwashing compliance score was reported to be 86% by Toraman et al.,[26] 81.44% by Mankan and Karakaşıkçı,[19] and 91.6% by Garcell et al.[27] In the literature, it is seen that the handwashing compliance of nurses is higher than other healthcare workers, but it is not at the desired level.[28] When the data of our study are examined, it is seen that it is compatible with the data of the literature. In the studies, it is stated that the most important reason affecting hand washing is the inadequate number of nurses per patient.[29,30] In the study, it is predicted that nurses' handwashing compliance rates not at the desired level may be due to the high number of patients per nurse in the institution, in line with the literature.

The items about the frequency of changing dressing in the catheter insertion site, recording of the change date, and immediate change of cover in case of being dirty or getting wet were the items that were answered most correctly in our study, with the same correct response rate as hand hygiene (93.2%). It is the nurse's responsibility to cover the catheter insertion site with sterile gauze, to change the dressing every 48 hours as long as it does not deteriorate, and to record it.[31,32] This is a pleasing finding. Different from our research findings, it was determined that most of the nurses did not know the frequency of changing dressings (gas/transparent) in CVC entrance and the recommended dressings.[14,15,33,34]

In the study, only 27 nurses knew that the item "Infusion sets given blood and blood components from CVC should be changed within 48 hours" was incorrect. In the study conducted by Batı and Özyürek,[14] 77.9% of the nurses answered correctly. On the other hand, In the study of Aydoğdu and Akgün[15] and in the study of Mankan and Karakaşıkçı,[19] 46.0% and 54.5%, respectively, of the nurses gave the wrong

answer to the item about the changing times of the infusion sets.[14,15,19] The study finding is not compatible with the stated study findings because it is higher than them. The reason for this is thought to be due to the questioning of the change date of the infusion sets through which total parenteral nutrition (TPN) solution, which is used more frequently and is thought to be known, is sent in some literature studies. At the same time, one of the factors that we think to have affected the data of the study is the quite higher number of the universe compared to ours. Consistent with the data of our study, Aytaç et al.[35] conducted a study to determine knowledge levels of nurses working in the intensive care units about the prevention of hospital infections and they applied a questionnaire on 210 nurses, only 27.1% of whom gave the correct answer to the question "How often should you change the serum sets?".

Study Limitations

This study has some limitations as well as contributing to the literature on determining the knowledge level of nurses working in pediatric clinics about central venous catheter care. One of these limitations is that the study was conducted in a state and a university hospital located in the province where it was conducted, and its findings were restricted to this sample only. Another limitation is that the entire targeted population could not be involved because some nurses could not be reached for various reasons. Therefore, this situation may have limited the generalizability of the research findings.

Conclusion

Nurses are directly responsible for the monitoring and care of CVCs. CR-BSI is a preventable complication that is frequently encountered especially in intensive care units and can be fatal. The incidence of many complications related to CVCs can be reduced with qualified nursing care. In the study, it was determined that the knowledge level of nurses on CVC was insufficient, and that educational status and having received training on CVC were important variables that increased the knowledge levels of nurses. Based on these results obtained, it is recommended that in-service training be increased in line with the protocol/procedure/instructions regarding CVC care, or that nurses should be encouraged to attend congresses/seminars/courses on this subject and to follow recent studies.

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Information

The study is derived from our thesis titled "Determination of the Knowledge Levels of Pediatric Nurses About Central Venous Catheter Care", for which I was thesis supervisor.

Ethics

Ethics Committee Approval: Ethical approval (dated 30.04.2019 and numbered 564) was obtained from the Bülent Ecevit University Human Research Ethics Committee in the province where the research was conducted.

Informed Consent: Informed consent was obtained.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Concept: H.T., T.K.A., Design: H.T., T.K.A., Data Collection or Processing: H.T., Analysis or Interpretation: H.T., T.K.A., M.S., Literature Search: H.T., T.K.A., M.S., Writing: H.T., T.K.A., M.S.

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