Assessment of Nurses' Knowledge Regarding Prevention of Central Venous Catheter Related Infection at Hemodialysis Center

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Abstract
Background: In today's medical practice, central venous catheters (CVCs) are extremely important, especially in intensive care units. This study aims to assess nurses' knowledge toward prevention of central venous catheter related infection.
Methods: At Mosul's Al-Salam Teaching Hospital, a descriptive research was conducted from December 23, 2022, to April 1, 2023. In order to include nurses in the study, the researchers used non-probability (purposive) sampling, choosing thirty nurses from the hospital.
Results: According to statistical findings, nurses' understanding of the conditions under which central venous catheters should be used was found to be at an acceptable level in 37.1% (13) of the sample. The percentage of nurses who did not know how important central venous catheters are was 62.9% (22). 51.4% (18) of the sample's nurses lacked awareness about the risks associated with usage. Of the group, 54.3% (19) had acceptable knowledge about preventing central venous catheter infections among nurses.
Conclusions: All demographic characteristics and the knowledge sections of nurses showed no significant link, with the exception of the relevance of central venous catheters and their indications for usage in relation to education level.
Recommendations: In addition to providing frequent training on CVC infection control, the hospital should ensure that its nursing staff is well-versed in CVC.

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Keywords: Nurses' Knowledge, Central Venous Catheter, Hemodialysis Center

Introduction

In today's medical practice, central venous catheters (CVCs) are extremely important, especially in intensive care units. They facilitate the consumption of greater amounts of highly concentrated liquids and drugs that harm peripheral veins (vesicant chemotherapy, parenteral nutrition, hypertonic antibiotic solutions), as well as the transfusion of blood and blood products, collection of blood samples for testing, monitoring of critically ill patients' hemodynamic status, and administration of liquids and drugs at the patient's home. (Woodrow, 2020) [8]. Even though CVC provides venous access which is absolutely necessary using it increases the risk of both local and systemic infections. Treatment-related complications such as CVC infections are significant and can impair prognosis, lengthen hospital stay, and raise treatment expenses. (O'Grady *et al*, 2020) [4]. The general state of the patient, length of hospital stays, anatomic catheter insertion site, lumen count, improper aseptic technique when handling CVC, type of dressing material, colonization of a catheter entry point, and colonization of a catheter attachment part are all factors that can affect the risk of infection. (Šmitek and Krist,2018) [7].

Methods

From December 23, 2022, to April 10, 2023, a descriptive study was conducted at the Al-Salam Teaching Hospital in Mosul, to

evaluate the nurses' knowledge regarding the prevention of central venous catheter-related infections. To include nurses in the study, the researchers used non-probability (purposive) sampling. Thirty nurses were chosen from the hospital. Two parts make up the questionnaire that was created and made available for students to evaluate their knowledge. Appendix (A), which consists of four sections, illustrates the nurses' knowledge regarding the prevention of central venous catheter-related infections. The first part of the document pertains to demographic information, including age, gender, and study stage. A pilot study was conducted to assess the reliability of tools, specifically the questionnaire tool. Five nurses were recruited at each stage of the study. Using SPSS version 25, the Pearson's coefficient of correlation result is (r=0.786) and is significant at the P <0.05 level. This was used to assess the scale (test-retest).

Results

Table 1: The Demographic Characteristics of the Sample in the Study

Demographic	Items	Freq	%	X^2	Sig.
Age	(20-24)	1	2.9	28.514[a]	0.000
	(25-29)	26	74.3		
	(30-34)	8	22.9		
Gender	Male	8	22.9	10.314[b]	0.001
	Female	27	77.1		
Level of Education	Nursing high school	1	2.9	28.514[a]	0.000
	Nursing institute	8	22.9		
	Bachelor of Nursing	26	74.3		
Years of employment	(1-5)	25	71.4	24.400[a]	0.000
	(6-10)	8	22.9		
	(11-15)	2	5.7		
	Total	35	100.0		

Freq: Frequency, **Sig:** significance

The demographic details of the study sample are shown in table (1). That is, 77.1% (27) of the sample is female, 74.3% (26) of the sample is educated to the bachelor's degree in nursing, and 71.4% (25) of the sample has served in general for one to five years.

Table 2: The Statistical Results for Nurses' Knowledge regarding Central Venous Catheters

Nurses' knowledge	Estimate	Freq.	%	X^2	Sig.
The indications for the use	Fail	5	14.3	12.286[c]	0.015
	Not Acceptable	6	17.1		
	Acceptable	13	37.1		
	Good	10	28.6		
	Excellent	1	2.9		
The importance of central venous catheters	Fail	22	62.9	27.057[d]	0.000
	Not Acceptable	5	14.3		
	Acceptable	3	8.6		
	Good	5	14.3		
The complications of using	Fail	18	51.4	0.029[b]	0.866
	Not Acceptable	17	48.6		
The prevent central venous catheteritis	Fail	3	8.6	19.743[d]	0.000
	Not Acceptable	10	28.6		
	Acceptable	19	54.3		
	Good	3	8.6		
Total		35	100.0		

Freq: Frequency, **Sig:** significance

The statistical data relating nurses' knowledge of central venous catheters and the indications for their use are shown in table (2). 37.1% (13) of the sample at p. value (0.015) of significance and chi-square (12.286c) at an acceptable level. When it comes to the nurses' understanding of the significance of central venous catheters, 62.9% (22) of the sample failed at the chi-square level (27.057d), with a p-value of 0.000 indicating significance. The nurses' awareness of the risks associated with using ware 51.4% (18) of the sample at the fail level had a chi-square of (0.029b) and a p-value of 0.866 that was non-significant. The nurses' familiarity with the prevention of central venous catheteritis 54.3% (19) of the sample at the threshold of acceptance, with a chi-square of (19.743d).

Table 3: The Statistical Results for Total Nurses' Knowledge regarding Central Venous Catheters

Etimate	Freq	%	X^2	Sig.
Fail	3	8.6	23.857[a]	0.000
Not Acceptable	12	34.3		
Acceptable	19	54.3		
Good	1	2.9		
Total	35	100.0		

Freq: Frequency, **Sig:** significance

The statistical findings for all nurses' knowledge of central venous catheters are shown in table (3). With a chi-square of (23.857a) and significance at p. value (0.000), 54.3% (19) of the sample were found to be at an acceptable level.

Table 4: Statistical Correlation of Demographic Characteristics Results with Nurses' Knowledge regarding Central Venous Catheters

Nurses' knowledge	Age		Gender		Level of Education		Years of employment	
	p.value	Sig.	p.value	Sig.	p.value	Sig.	p.value	Sig.
The indications for the use	0.948	NS	0.738	NS	0.050	S	0.922	NS
The importance of central venous catheters	0.800	NS	0.279	NS	0.001	HS	0.783	NS
The complications of using	0.674	NS	0.384	NS	0.166	NS	0.643	NS
The prevent central venous catheteritis	0.265	NS	0.988	NS	0.161	NS	0.866	NS
Total Nurses' knowledge	0.840	NS	0.286	NS	0.068	NS	0.458	NS

The statistical link between the results of demographic variables and the nurses' understanding of central venous catheters is shown in table (4). Except for the indications for use with Level of Education at p.value (0.050) and the significance of central venous catheters likewise with Level of Education at p.value (0.001), there was no significant association found between the all-demographic characteristics and the knowledge sections of nurses.

Discussion

1. Discussion of sociodemographic variables

The demographic details of the study sample are shown in table (1). That is, 77.1% (27) of the sample is female, 74.3% (26) of the sample is educated to the bachelor's degree in nursing, and 71.4% (25) of the sample has served in general for one to five years. This study is corroborated by (Foka *et al*, 2021) [3], wherein nurses have been the primary study group in the majority of studies evaluating healthcare professionals' blood infection knowledge. And corroborated by another study (Qadire and Hani,2020) [6] They are the ones who provide continual care to patients and play a significant role in the care and maintenance of vascular catheters, which is why they have shown considerably superior understanding in this field than physicians. Even said, this knowledge still has to be standardized because it is inadequate.

2. Discussion of nurses' knowledge about central venous catheter infection

The statistical results for nurses' knowledge of central venous catheters are shown in table (2). 37.1% (13) of the sample had nurses' knowledge of the indications for using central venous catheters at an acceptable level. When it came to the nurses' understanding of the significance of central venous catheters, 62.9% (22) of the sample failed. 51.4% (18) of the sample's nurses lacked awareness about the risks associated with usage.Of the group, 54.3% (19) had acceptable knowledge about preventing central venous catheter infections among nurses. (Qadire, 2017) [5] provides support for this study. Research has demonstrated that providing nursing personnel with systematic, brief training improves their knowledge and lowers the prevalence of CLABSI. Additionally, this study is supported by (Acharya, 2019) [1], which finds up to 41.7%. Only one study (out of 27) did not demonstrate a decrease in CLABSI patients following the provision of sufficient educational instruction. It seems that more research is required to determine how staff education including that of nurses and doctors affects the transmission of nosocomial diseases. Regular training is also obviously important.

3. Discussion of relationship between nurses' knowledge and demographic variables

The statistical link between the results of demographic variables and the nurses' understanding of central venous catheters is shown in table (4). With the exception of the indications for use and the significance of central venous catheters, which were both correlated with level of education at p.values of 0.001 and 0.050, respectively, there was no significant link found between the demographic characteristics and the knowledge sections of nurses. The study's findings are corroborated by Esposito *et al* (2017) [2], who demonstrated that it was evidently necessary to incorporate the most recent evidence-based practice guidelines into healthcare personnel' education programs.

Conclusions

In the first and fourth domains, the nurses' level of knowledge was deemed acceptable; in the second and third domains, it was deemed inadequate. All of the nurses' knowledge was deemed adequate. Only the first and second domains of nurses' education showed a significant link between their knowledge of central venous catheters and their demographic features. The knowledge sections of nurses and all other demographic characteristics did not significantly correlate.

Recommendations

The nursing team needs to have thorough knowledge of and training in CVC. Periodically, the hospital should offer seminars on CVC infection prevention. In order to ensure that nurses are properly educated and trained in CVC infection prevention, the ministry of health should provide training programs.

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