

NURSES' PERFORMANCE FOR PREVENTING COMPLICATIONS CENTRAL VENOUS CATHETER IN INTENSIVE CARE UNIT

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Abstract

Background: An essential component of patient care in the intensive care unit (ICU) is the use of central venous catheters (CVC), there are several uses for central venous and arterial catheters, such as medicine delivery, renal dialysis, central feeding, blood collection, and patient monitoring. However, a variety of serious complications are linked to it, including thrombosis, contaminations, dislodgment, and pinch-off syndrome. This study aimed to evaluate nurses' performance in preventing complications of central venous catheters in the intensive care unit.

Materials and Methods: A descriptive design study was conducted from October 1, 2023, to January 15, 2024. A non-probability purposive sample of 60 nurses from different educational levels, genders, and critical care unit at Baghdad teaching hospitals was selected. Data collected were analyzed using SPSS version 25.0.

Results: The study comprised a majority of the study sample was female (76.7%), with the majority (78.3%) aged between 21 and 30 years. A significant proportion (58.3%) of nurses held institute degrees. and the majority (53.3%) had 1-5 years of experience.

Conclusions: The findings indicate that nurses possess satisfactory performance toward the prevention of central venous catheters complications in the intensive care unit. It is recommended to conducting training courses for nurses within continuous education in hospital is crucial to increase nurses' knowledge toward standard practices.

Keywords: Central venous catheter, Prevention complications, Critical care nurses, Intensive care unit.

1. INTRODUCTION

Central venous lines are very crucial in intensive care units in patient care and management. Central lines are very common, especially in intensive care units facilitating advanced patient care. However, malpractice can cause high morbidity, morbidity, and financial burden⁽¹⁾. The use of CVCs has risen over the past decade due to their relative ease in placement and necessity for many lifesaving treatments for the administration of fluids, medications, blood products, parenteral nutrition, and monitoring the hemodynamic status of patients⁽²⁾. The different types of CVCs that are available, in clinical, are classified according to illness situation, medical workers can choose short-term or long-term CVCs for patients to implement treatment⁽³⁾. All types of CVCs have their specific nursing care because they have diverse complications and possible problems⁽⁴⁾. The CVC has become an essential component in patient care. However, it can be associated with a wide range of complications such as infection, thrombosis, dislodgment, and obstruction. Such complications can increase the morbidity, and mortality rate, and disrupt treatment plans. Furthermore, length of stay, hospitalization rate, and cost of treatment can be increased because of these complications⁽⁵⁾. The rate of complications of central venous puncture is estimated at 15%. 1,5 related to this procedure are divided into mechanical and infectious. The most common mechanical complications are arterial puncture, hematoma, pneumothorax, hemothorax, arrhythmia, thoracic duct injury, cardiac tamponade, air embolism, or guide wire embolism is rare but potentially more severe. Infectious

complications (especially catheter-related bloodstream infections), however, besides being potentially serious, are classically associated with high morbidity and mortality and high hospital costs⁽⁶⁾. Less common but more dangerous complications are superior vena cava wall perforation, left atrium wall perforation with cardiac tamponade, mediastinal hematoma, aorta perforation, and hearth tamponade. The infections related to CVC application make up 10-15% of nosocomial infections in ICU, and sepsis is the most important and the hardest by its complications⁽⁷⁾. Inadequate nursing awareness of routine CVC treatment and maintenance leads to poor patient outcomes, such as increased complication rates (e.g. CLABSIs and occlusions), increased morbidity and mortality, and prolonged hospital stay, after the catheter is implanted, the nurse is responsible for CVCs care. Proper care provided by the nurse also affects the rate of development of infections and other catheter-related complications⁽⁸⁾. Nurses play an important role in providing care for patients connected with central venous catheters. They assist in central line insertion, care of its dressing, withdrawal of a venous blood sample, and delivery of drugs. As well as they teach the patients if oriented and their families about the specialized care of central venous catheters. Therefore, they contribute to reducing the risk of infection⁽⁹⁾. This study aimed to evaluate nurses' performance in preventing complications of central venous catheters in the intensive care unit, to avoid or reduce these consequences, health professionals—especially nurses who utilize these catheters—should follow standard procedures.

2. Materials and Methods

2.1 Study Design and Setting:

This descriptive study aimed to evaluate nurse's performance related to central venous catheter complications among 60 nurses working in the male and female intensive care units of four Teaching Hospitals in Baghdad city. The study spanned from October 1, 2023, to January 15, 2024.

2.2 Study Participants and Sampling:

A non-probability (purposive) sampling technique was employed to select four hospitals for the study, representing various healthcare facilities in Baghdad city. The chosen hospitals included Baghdad Teaching Hospital, Al-Kindeg Teaching Hospital, Al-Kahdema Teaching Hospital, and AL-Yarmuk Teaching Hospital. Specifically, intensive care units from these hospitals were purposively, ensuring representation from different educational levels and both genders (males and females). This deliberate selection aimed to capture insights from nurses working in areas where they encounter a substantial number of patients with central venous catheter.

2.3 Inclusion and exclusion criteria:

The sample was selected based on the specific criteria such as the nurses from different educational levels, genders, and working in critical care unit at Baghdad teaching hospital. Exclusion criteria nurse had less than 1 year of experience in critical care unit.

2.4 Data Collection Tools and Technique:

Data were collected using two tools as follows: 1-self-administered nurses' questionnaire, 2- nurses' observational checklists:

1-self-administered nurses' questionnaire: it's composed of one part:

□ Part I: consisted of the nurse's demographic data including age, gender, education level, years of experience, number of training courses, whether participants had developed their knowledge within the field and self-learning source.... etc.

2. Nurses' observational checklists: Consisting of 25 items, this sheet is evaluated on a three -point Likert scale (1 = not

apply, 2 = partial apply, 3 = complete apply). The total score ranged from 1 to 3, with categories of unsatisfactory (1-1.66), satisfactory (1.67-2.33), and high satisfactory (2.34-3) nurses' performance.

2.5 Data Analysis:

Statistical Package for Social Science (SPSS) version 25.0 was used for data analysis. Descriptive statistics (mean, standard deviation, frequency, and percentage) were employed. Chi-square was utilized for determining the relationship between demographic data and nurses' performance. A p-value ≤ 0.05 was considered significant.

2.6 Ethical Considerations:

The study received approval from the Scientific Research Ethical Committee at the College of Nursing, University of Baghdad. Permission was obtained from the four participating hospitals. Informed written consent was secured from participating nurses, ensuring voluntariness and the option to withdraw at any time. Confidentiality of collected data was strictly maintained. The researcher provided clear explanations of the study's aims to the nurses and obtained verbal consent.

3. Results

Table 1 illustrates the demographic characteristics of the study participants. A higher representation of female than male nurses (76.7%) was observed, with a majority falling within the age group of 21-30 years (78.3%). The majority held an Institute graduate degree (58.3%), and a significant portion had 1-5 years of experience (53.3%) with training courses (86.6%). Additionally, 93.3% of participants possessed information about central venous complications, with 41.7% obtaining information from the Internet and social networking sites. Table 2 outlines the total nurse's performance regarding the prevention of central venous catheter complications, revealing a commendable level of performance, as evidenced by means of score (1.89±0.325) of Satisfactory. Table 3 explores the relationship between demographic variables (Gender, Age, Educational Level in Nursing, and Experience of Years in Nursing) and nurses' performance, revealing no significant differences.

Table 1. Distribution of the Nurses Sample According to Socio-Demographical Characteristics Variables n=60 Nurses

Variables	Groups	Frequency	Percent
Gender	Male	14	23.3
	Female	46	76.7
	Total	60	100.0
Age (Groups)	21- 30 Years	47	78.3
	31- 40 Years	10	16.7
	41- 50Years	3	5.0
	Total	60	100.0
	M± Std. 27.43±5.027		
Level of Education in Nursing	Nursing high school graduate	12	20.0
	Institute graduate	33	58.3
	College of Nursing	13	21.7
	Total	60	100.0
Experience of Years in Nursing	1-5 years	32	53.3
	6-10 years	20	33.3
	11-15 years	6	10.0
	≥16 years	2	3.3
	Total	60	100.0
Training Course	Yes	52	86.7
	No	8	13.3

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Do you have any information about the prevention of central venous complications?	Yes	56	93.3
	No	4	6.7
	Total	60	100.0
(If yes) Indicate the source of central venous complications.	No have information	5	8.3
	The internet...social networking sites	25	41.7
	The Internet... solid scientific sites	24	40.0
	Other: work in intensive care unite	6	10.0
	Total	60	100.0

Table 2. Nurse’s Performance Domain about Prevention of Central Venous Complications.

Performance	Estimate	F.	Mean± Std.	Evaluation
Level of Performance	Unsatisfactory	21(35.0)	1.89±0.325	Satisfactory
	Satisfactory	35(58.3)		
	High Satisfactory	4(6.7)		
Total		60		

M.s=mean of score,

SD=stander deviation, UN= Unsatisfactory (1-1.66); S= Satisfactory (1.67-2.33); HS= High satisfactory (2.34-3).

Table 3 Association between demographic characteristics and Nurses’ Performance domain

Socio-demographic variables	Performance level		
	Contingency Coefficients	P value	Sig.*
Gender	0.436	0.798	NS
Age groups	0.686	0.351	NS
Educational level in nursing	0.696	0.251	NS
Experience of Years in Nursing	0.711	.874	NS

* Sig. = significance level ≤ 0.05 = significant

4. Discussion

Upon analyzing the socio-demographic characteristics of the nurses in our study, it was observed that the majority of respondents were female, and the remaining participants were male. This result is consistent the predominant age group was between 21 and 30 years old, with fifty three point three percent of the study sample having (1-5) experience years in nursing. In terms of educational background, a significant portion of the sample held an institute graduate degree, while less than half were graduates from Nursing college. These findings align with a many studies results showed where the mean age of nurses in the study was (27.43 + 5.02) (10-14).other study in Baghdad city that show study indicate that nearly half (49%) of the respondents were in the age group of 28-37 years old, with a mean age of 33.73±7.045 years and most of them had 1-5 years of experience as a nurse in the intensive care unit (15,16).Other study in the Intensive Care Units at Damanhur university hospital in Egypt, the results showed that regarding to sociodemographic data 80% of the studied nurses were females, 76% of the studied nurses their age ranged between 20-30 years, 40% of the studied nurses had nursing institute and 60% of the studied nurses had training courses (17).Regarding their gender, it was found that the majority of nurses (76.7%) were females and (58.3) were Diploma/ Technical Institute nurses. more than half (78.3%) of the study sample were aged from (21 to 30) years old, agreeing with study showed that more than half (59.0%) of the studied nurses were aged (21to31) years old, nearly half (49.0%) of the studied nurses had a bachelor of nursing (18). Similar to other study show that the dominant age group of nursing staff is (48%) at age group (25-29) years old (19). Other studies in Australian tertiary hospital show that majority of study sample (76.9%) for female and remaining (23.1%) male with age group 28 and 48 years old (20).Concerning years of experience (53.3) of the study sample had (1-5) years of

experience in the nursing field This finding is in agreement with study in Al- Nasiriyah Cardiac Center, indicated by that the study 23(76.7%) in the study group, 28(80%) in the control group have (1-5) years of working in ICU and surgical wards(8). This result is inconsistent with study that found that the age, most of nurses at age group (20-29) years and (48.3) of study sample had (1-5) experiences years (21), This trend is consistent with the observation of Shrestha, , who indicated that the majority of study sample (85.5%) have (0-5) years of experience in nursing(22).other study show that Majority (83%) of nurses had training course(23) Our study discovered that the majority of participants were well-informed about the prevention of CVC complications, with 93.3% obtaining information from the Internet and social networking sites. This aligns with the results of more than one-third (86 percent) of nursing personnel had attended in-service education related to CVC Care Bundle(24). Regarding nurses’ performance toward central venous catheter complications our study demonstrates more than half (58.3%, Mean± Std. Deviation =1.89±0.325) nurses exhibited satisfactory performance while thirty five percent displaced poor complications prevention performance this aligns with Nurse-led peripherally inserted central venous catheter program reduced centrally inserted central catheters utilization without affecting the quality of peripherally inserted central venous catheter placement or complication rate (25). similar to other study shows that nurses had a low level when response to all items except the items (one and Twenty-Five) at the moderate level and the items (Three, Four, Six, Twenty Two, Twenty Three, Twenty Four)and two at high level and item the grand mean was (2.05) at moderate level (19).Other study show that the rate of central line-associated bloodstream infections was significantly lower in the intervention group (2.85/1000 central line days) than in the control group (3.35/1000 central line days) (P=0.042). The number of accesses to the central line by the

nurses decreased significantly in the intervention group compared to the control group ($P < 0.001$). The mean score for the nurses' evidence-based guideline post-education knowledge (70.80 ± 12.26) was significantly higher than that pre-education (48.20 ± 14.66) ($P < 0.001$)⁽²⁶⁾. Furthermore, our study identified there are no significant differences among, Gender, Age groups, Educational level in nursing, and Experience of Years in nursing, when analyzed. Similar findings were reported by Hussein & Shaker, (2016)^(27,15). similar to other study shows that working experience, the number of insertions, the level of knowledge of nurses about PIVC, and the place of care in the radiant warmer were associated negatively with a decrease in the level of nurse compliance in the use of aseptic central intravenous catheter techniques ($\beta = -0.011$; -0.152 ; $p < 0.001$)⁽²⁸⁻³²⁾.

5. Limitations

A notable limitation of our study is the relatively smaller sample size, restricting the generalizability of findings to all nurses across various hospital types in Baghdad Teaching Hospitals.

6. Conclusions

Approximately two-quarters of nurses in selected hospitals demonstrated a satisfactory level of nurse's performance regarding the prevention of CVC complications. The absence of a standardized guideline regarding prevention of CVC complications in Iraqi ICUs made most of Iraqi nurses to practice what senior nurses do. The study is suggesting conducting training courses for nurses within continuous education in hospital is crucial to increase nurses' knowledge toward standard practices. Additionally, incorporating evidence-based practice into undergraduate nursing programmers can significantly improve the performance of students who will eventually become ICU nurses. All of these actions can save expenses, improve patient safety, lower the standard of care, and lessen employee burnout.

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