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Critical Care Nurses' Practices and their Challenges regarding Infection Prevention of Central Venous Catheter

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Abstract:
Background: Health care-associated infections (HAIs) in central line continues to be one of the most important public health problems in critical care setting, and leading cause of morbidity and mortality among hospitalized patients. **Aim of the Study:** To assess critical care nurses' practice and their challenges regarding infection prevention of central venous catheter. **Research Design**: A descriptive correlational research design was used in this study. **Setting:** This study subject was conducted in Intensive Care Units at Al-Eman General Hospital and Assiut General Hospital, Egypt. **Sample:** The study subjects were included a convenience sampling of all critical care nurses who work in the previous mentioned setting and who give direct care to critically ill patients with central venous catheters. **Tools**: Tool one: demographic data. Tool two Critical care nurses' challenges regarding infection prevention of central venous catheter questionnaire and Tool three: Critical Care Nurses' Practice (Observational Checklist). **Results:** It was found that nearly forty percent of nurses were poor regarding challenges for infection prevention of central venous catheter Also, most of the nurses had unsatisfactory practice regarding CVC. **Conclusion:** Forty percent of critical care nurses had many challenges for infection prevention of central venous catheters, such as a prolonged duration of catheterization, work overload, lack of available resources for antimicrobials. **Recommendations :**Performing training programs for nurses regarding prevention of central line infection.

Keywords: Central Venous Catheter, Challenges, Critical Care Nurses, Infection Prevention & Practices

Introduction:
Central line-related infections in critically ill patients are potentially fatal infections and are associated with a substantial increase in long hospital stay and total hospital cost. Nosocomial infections are preventable by adherence to procedures and policies designed to limit spread of infection between patients and between ICU staffs and patients **(Mohammed et al., 2021).**

A major challenge related to complexity of factors affecting ICU nurses' central venous catheter (CVC) access procedure compliance from a different perspective than previous research. The individualized nursing practice and risk delineate barriers hindering the use of the evidence-based procedure when accessing CVCs. Patients' exposure to preventable infection risks could be reduced by applying these nursing practices to inform and strengthen continuing education programs and ICU audit processes. (**Morris and Jakobsen,2022)**

The issue of healthcare-associated infections (HAIs) in central line continues to be one of the most important public health problems in critical care settings, and these infections remain a leading cause of morbidity and mortality among hospitalized patients. Also, with an increase in consumption of resources and added cost. Central line-associated blood stream infections (CLABSIs), the majority related with the use of the central venous catheter (CVC), are the most important complications in critical care **(Walsh and Fitzsimons, 2023).**

Nursing role at critical settings had several risk factors have been identified for CLABSIs in patients who undergo central line procedures such as, for example, a prolonged duration of catheterization, microbial colonization at the insertion site and of the catheter hub, and inadequate care and maintenance of the CVC after insertion. Therefore, improving the quality of the health care is a key priority, since reduction of CLABSIs may be achieved through efforts with adherence to appropriate preventive measures in line with evidence-based recommendations
(Weiner et al., 2021).

Significance of the Study:
Worldwide, the lowest average number of catheter days was 4.6 days in 2020, and the highest was 6.2 days in 2021. The highest infection rate was 1.51 times per 1,000 catheter days in 2022 and the lowest was 0.63 times per 1,000 catheter days in 2023. The most common causative bacteria were gram-negative

bacteria, which are multidrug resistant, including Klebsiella pneumoniae and Acinetobacter baumannii. In conclusion, the incidence of infection tended to decrease continuously. Nurses should play a significant role in reviewing the problem and searching for practical preventive procedures, such as by increasing the scrub hub and using an antiseptic barrier cap, as well as by monitoring and supervising practices. **(Pitiriga et al., 2023)**

The number of patients who were admitted to Intensive Care Units at Al-Eman General Hospital and Intensive Care Units at Assiut General Hospital during 2021-2022 was 2559 and 1568 patients, respectively (records show most of these patients had CVC monitors).(**Record from most of these patients had CVC monitor)**

Aim of the Study:

The study aim is to assess critical care nurses' practice and their challenges regarding infection prevention of central venous catheter.

Research Question:

- What is the level of critical care nurses' practice regarding infection prevention of central venous catheter?
- What are the challenges facing critical care nurses regarding infection prevention of central venous catheter?

Subjects and Methods:

Research Design: A descriptive correlational research design was used in the present study.

Setting:

This study was conducted in intensive care units at Al-Eman General Hospital and Assiut General Hospital (general intensive care unit and coronary care unit). Intensive care units at Al-Eman General Hospital include the general intensive care unit, medical intensive care unit, coronary care unit, and neurosurgery intensive care unit.

Sampling:

The study subjects were included a convenience sampling of all critical care nurses from the both sex who work in the previous mentioned setting and who give direct care to critically ill patients with central venous catheters.

Data Collection Tools:

Tool One: Demographic Data: It included age, gender, social status, qualifications, and experience years in critical care nursing, previous workshop or training on infection prevention of central venous catheters, and work setting.

Tool Two: Critical Care Nurses` Challenges Questionnaires

This tool was developed by the researcher after a review of the related literature (**Workeneh, 2019; Khalil, 2018**) to assess nurses challenges regarding infection prevention of central venous catheters as workload challenges, psychological load challenges, technical support challenges, and sense of responsibility challenges.

Scoring system: The overall domain score was calculated by summing all items in each domain and then dividing by the number of items. The scoring was a minimum score of 25 and maximum score = 75 and divided into three Likert Scale that included Disagree =1, Neutral = 2 and Agree = 3.

Scoring levels: (Poor (< 60), Fair (60-69), Good (70 - 74) and Very good (> 75)

Tool Three: Critical Care Nurse's Practice Tool (Observational Checklist):

The observation checklist was developed by the researcher after reviewing the related national and international literature (**Aloush et al., 2018; Benson & Powers, 2011**) to assess the nurses' practice regarding infection prevention of central venous catheters**.**

Scoring System: The observational checklist**:** The overall domain score was calculated by summing all items in each domain and then dividing by the number of items. The scoring was minimum score = 19 and maximum score = 38.

Scoring levels divided into Satisfactory (≥ 75 %) and Unsatisfactory (≤ 75 %)

Methods:

The study was conduct through the following phases:

Preparatory Phase:

- Official permission of carry out the study was taken from the responsible head of at Al-Eman general Hospital and Assiut General Hospital in Assiut Governorate to conduct the study.
- The study tools were developed by the research after extensive literature review.

Pilot Study:

A pilot study was conducted on 10% from nurses. 10 nurses worked in the selected setting to examine the applicability, feasibility, efficiency and clarity of the developed tools.

Content Validity and Reliability:

- Content validity of the study was done by a jury of five experts in critical care nursing who are specialists in the field of critical care nursing from the Faculty of Nursing, Assiut University, and necessary modifications were done.
- Reliability of the study tool: The reliability of the test was calculated by using the correlation coefficient, and it was estimated by Alpha Cornbrash's test for this study. Which were accept tool two = 0.89 and tool three = 0.091.

Ethical Considerations:

- Official permission of carry out the study was taken from the responsible head of at Al-Eman general Hospital and Assiut General Hospital in Assiut Governorate to conduct the study.
- Research proposal was approved from Ethical Committee permission at 27-11-2023 in the Faculty of Nursing
- The study was carried out carefully, adhering to ethical guidelines for clinical research, and all participant rights were maintained. The study's proposal was approved by the ethical committee, faculty of nursing, Assuit University, and written consent was obtained from all studied nurses. study was followed common ethical guidelines in clinical research. The right to decline, withdraw, and participate in the study was underlined, as was the assurance of respondent anonymity and conditionality. Staff nurses were informed by the researcher that all data collected would be used only for research purposes.

Phase (II): Data collection:

- Data collection for six months.
- The researcher explained to each nurse participant what the study was about as well as their rights and roles as study participants, then using face-to-face interviews, reviewed the inclusion criteria of all nurses who worked in the study ICUs.
- Nurses who met the study inclusion criteria and were interested in participating in this study were enrolled to participate. The researcher handed out the questionnaires after Arabic translation to the participants in sealed envelopes. Instructions were provided on how to complete the questionnaires.
- Data was collected within six months. The researcher assessed the socio-demographic data of nurses by using Tool 1 (Part I). Every nurse was interviewed to know their opinions about the challenges that face them regarding infection prevention guidelines for central venous catheters by using tool two.
- The researcher assessed the nurses' practice observational checklist insertion manipulation regarding infection prevention of central venous catheters during their shifts by using tool three. To avoid missing data, the researchers instructed all nurses to answer all questions.

Statistical Design:

The collected data was organized, categorized, coded, tabulated and analyzed using the Statistical Package for Social Sciences (SPSS) version 27. Data was presented in tables and figures using numbers, percentages, means, standard deviation and chi-square was used in order to find an association between two qualitative variables. Statistically significant was considered at P-value < 0.05.

Results:

Table (1): Percentage Distribution of Nurses' Demographic Data (No = 100)

Demographic Data		No	%
Age	**M±St.D**	31.6 ± 9.4	
Age Groups			
	20-29 Years	55	55.0
	30-39 Years	18	18.0
	40-49 Years	24	24.0
	≥ 50 Years	3	3.0
Marital Status	Single	50	50.0
	Married	45	45.0
	Divorced	4	4.0
	Widow	1	1.0
Gender			
	Male	32	32.0
	Female	68	68.0
Setting	Assiut General Hospital	51	51.0
	Al-Eman General Hospital	49	49.0
Educational qualification	Diploma	25	25.0
	Technical Institute	28	28.0
	Bachelor’s Degree	47	47.0
Years of experience	Less than 1 Year	6	6.0
	1 to 5 Years	49	49.0
	6 to 10 Yyears	24	24.0
	More than 10 Years	21	21.0
Attendance of Previous Training:	Yes	75	75.0
	No	25	25.0

Table (2.a): Percentage Distribution of Critical Care Nurses Regarding Challenges Questionnaire (N = 100):

	Critical Care Nurses' Challenges Questionnaire	Disagree	Neutral	Agree
	Assess Workload Challenges			
1	Increased in workload	11 (11.0%)	23 (23.0%)	66 (66.0%)
2	Inadequate time to complete the work assigned to him.	5 (5.0%)	24 (24.0%)	71 (71.0%)
3	Need to work long hours (as night shift).	29 (29.0%)	32 (32.0%)	39 (39.0%)
5	Large number of patients at ICUs	7 (7.0%)	26 (26.0%)	67 (67.0%)
6	Increase the number of working hours	9 (9.0%)	23 (23.0%)	68 (68.0%)
	Assess Psychological Load Challenges			
7	Dealing with sever medical condition and emergency disease with little hope of recovery	17 (17.0%)	30 (30.0%)	53 (53.0%)
8	Fear of the possibility of contracting infectious diseases	26 (26.0%)	37 (37.0%)	37 (37.0%)
9	Dealing with patients with different value and beliefs	29 (29.0%)	30 (30.0%)	41 (41.0%)
10	Dealing with patients who do not adhere to the instruction	18 (18.0%)	41 (41.0%)	41 (41.0%)
11	Lack of appreciation for his/her efforts	13 (13.0%)	33 (33.0%)	54 (54.0%)
12	Conflict between nurses and doctors	32 (32.0%)	23 (23.0%)	45 (45.0%)
	Assess Technical Supports Challenges			
13	Lack of availability of beds, examination rooms, some equipment and medicines.	20 (20.0%)	29 (29.0%)	51 (51.0%)
14	Lack of appropriate offices for nurses	16 (16.0%)	24 (24.0%)	60 (60.0%)
15	The presence of some high-tech devices exceed their abilities	29 (29.0%)	22 (22.0%)	49 (49.0%)
16	Unavailability of chance to introduce your abilities and skills.	18 (18.0%)	34 (34.0%)	48 (48.0%)
17	Working atmosphere filled with tension and stress	17 (17.0%)	31 (31.0%)	52 (52.0%)

Continued Table (2.b): Percentage Distribution of Critical Care Nurses Regarding Challenges Questionnaire (N = 100)

	Critical Care Nurses' Challenges Questionnaire	Disagree	Neutral	Agree
	Assess Sense Responsibility Challenges			
1	Sense of responsibility for some of the equipment and materials, medicines and supplies.	28 (28.0%)	44 (44.0%)	28 (28.0%)
2	Sense of responsibility for some critical case.	12 (12.0%)	22 (22.0%)	66 (66.0%)
3	Do not specify the duties and responsibilities of nursing	34 (34.0%)	31 (31.0%)	35 (35.0%)
4	Lack of managerial and leadership competence of your superiors	20 (20.0%)	42 (42.0%)	38 (38.0%)
5	Lack of support superiors at work.	21 (21.0%)	38 (38.0%)	41 (41.0%)
	Assess Role Conflict Challenges			
6	Working time and long shift are contrary to family.	17 (17.0%)	53 (53.0%)	30 (30.0%)
7	Family life is risked by the choice of nursing profession.	25 (25.0%)	30 (30.0%)	45 (45.0%)
8	Instability in family life due to increased working hours and night shift.	16 (16.0%)	28 (28.0%)	56 (56.0%)
9	I received professional training and acknowledge of how to handle critical situation.	7 (7.0%)	31 (31.0%)	62 (62.0%)

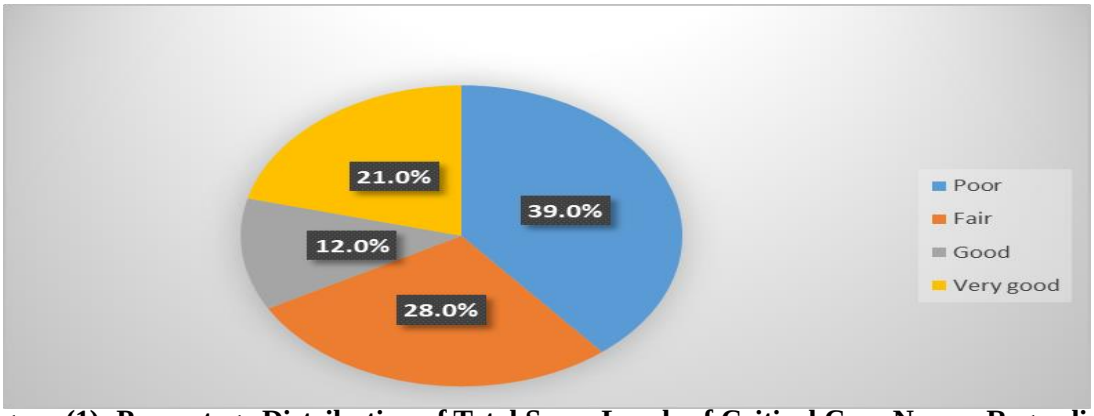

Figure (1): Percentage Distribution of Total Score Levels of Critical Care Nurses Regarding Challenges Questionnaire (No = 100)

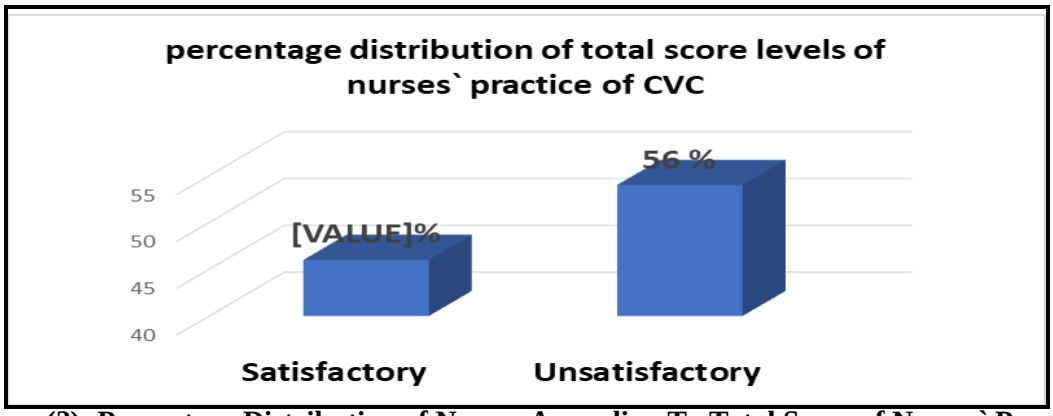

Figure (2): Percentage Distribution of Nurses According To Total Score of Nurses` Practice Regarding Central Venous Catheter Care (N= 100).

Table (3): Relation between Total Score Levels of Critical Care Nurses` Challenges and Demographic Data (N = 100):

Characteristic		Total Score Levels of Critical Care Nurses` Challenges				P . value
		Poor	Fair	Good	Very Good	
Age group	20-29 Years	16 (41.0%)	18 (64.3%)	8 (66.7%)	13 (61.9%)	.287
	30-39 Years	9 (23.1%)	4 (14.3%)	3 (25.0%)	2 (9.5%)	
	40-49 Years	13 (33.3%)	6 (21.4%)	0 (0.0%)	5 (23.8%)	
	50 Years or above	1 (2.6%)	0 (0.0%)	1 (8.3%)	1 (4.8%)	
Gender	Male	14 (35.9%)	8 (28.6%)	5 (41.7%)	5 (23.8%)	.663
	Female	25 (64.1%)	20 (71.4%)	7 (58.3%)	16 (76.2%)	
Marital Status	Single	16 (41.0%)	15 (53.6%)	5 (41.7%)	14 (66.7%)	.119
	Married	22 (56.4%)	12 (42.9%)	5 (41.7%)	6 (28.6%)	
	Divorced	1 (2.6%)	1 (3.6%)	2 (16.7%)	0 (0.0%)	
	Widow	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (4.8%)	
Setting	Assiut General Hospital	7 (17.9%)	15 (53.6%)	9 (75.0%)	20 (95.2%)	.001*
	Al-Eeman General Hospital	32 (82.1%)	13 (46.4%)	3 (25.0%)	1 (4.8%)	
Educational Qualification	Diploma	3 (7.7%)	10 (35.7%)	5 (41.7%)	7 (33.3%)	.001*
	Technical Institute	7 (17.9%)	6 (21.4%)	3 (25.0%)	12 (57.1%)	
	Bachelor's Degree	29 (74.4%)	12 (42.9%)	4 (33.3%)	2 (9.5%)	
Years of Experience	Less than 1 Year	2 (5.1%)	1 (3.6%)	0 (0.0%)	3 (14.3%)	.333
	1 – 5 Years	17 (43.6%)	15 (53.6%)	8 (66.7%)	9 (42.9%)	
	6 – 10 Years	11 (28.2%)	8 (28.6%)	3 (25.0%)	2 (9.5%)	
	More than 10 Years	9 (23.1%)	4 (14.3%)	1 (8.3%)	7 (33.3%)	
Attendance of Previous Training	Yes	33 (84.6%)	14 (50.0%)	3 (25.0%)	2 (9.5%)	.001*
	No	6 (15.4%)	14 (50.0%)	9 (75.0%)	19 (90.5%)	

Chi-Square Test for (Number and percentage).

Table (4): Relation between Total Score Levels of Critical Care Nurses Practice and Demographic Data (N = 100):

Characteristic		Total Score Levels of Critical Care Nurses` Practice		P – value
		Satisfactory	Unsatisfactory	
Age Group	20-29 Years	31 (67.4%)	24 (44.4%)	.001*
	30-39 Years	11 (23.9%)	7 (13.0%)	
	40-49 Years	2 (4.3%)	22 (40.7%)	
	50 Years or above	2 (4.3%)	1 (1.9%)	
Gender	Male	8 (17.4%)	24 (44.4%)	.004*
	Female	38 (82.6%)	30 (55.6%)	
Marital Status	Single	24 (52.2%)	26 (48.1%)	.099
	Married	18 (39.1%)	27 (50.0%)	
	Divorced	4 (8.7%)	0 (0.0%)	
	Widow	0 (0.0%)	1 (1.9%)	
Setting	Assiut General Hospital	38 (82.6%)	13 (24.1%)	.001*
	Al-Eman General Hospital	8 (17.4%)	41 (75.9%)	
Educational Qualification	Diploma	21 (45.7%)	4 (7.4%)	.001*
	Technical Institute	19 (41.3%)	9 (16.7%)	
	Bachelor's Degree	6 (13.0%)	41 (75.9%)	
Years of Experience	Less than 1 Year	4 (8.7%)	2 (3.7%)	.103
	1 – 5 Years	26 (56.5%)	23 (42.6%)	
	6 – 10 Years	11 (23.9%)	13 (24.1%)	
	More than 10 Years	5 (10.9%)	16 (29.6%)	
Attendance of Previous Training	Yes	45 (83.3%)	13 (28.3%)	.001*
	No	9 (16.7%)	33 (71.7%)	

Chi-Square Test for (Number and percentage).

Table (1): Illustrates the demographic data of the critical care nurses. Regarding age, it was found that M±SD was (31.6 ± 9.4). Concerning age groups, it was found that more than half of the studied nurses (55.0%) had age from 20 to 29 years. As regard gender, it was found a majority of nurses (68.0%) were female, while male nurses were (32.0%). As regard a marital status, it was found that half of nurses (50.0%) were single. Regarding to type of healthcare facility, it was observed that more than half of nurses (51.0%) worked in Assiut general hospitals. As regard to educational qualifications and years of experience, it was found that less than half (47.0% & 49.0%) had bachelor's degree and 1 to 5 years of experience respectively. Regarding to Attendance of previous training, it was found that more than half of nurses (75%) attend infection control seminars.

Table (2.a): Showes nurses' challenges regarding infection prevention of central venous catheter. Regarding workload challenges, it was found that 66.0% agreed with increased workload, 71.0% of nurses agreed with inadequate time to complete the work assigned to them, 39.0% agreed with needing to work long hours, 67.0% agreed with a large number of patients at ICUs and 68.0% agreed with increasing the number of working hours. Regarding to psychological load challenges, it was observed that 53.0% agreed with dealing with severe medical conditions and emergency diseases with little hope of recovery, 41.0% agreed with dealing with patients with different values and beliefs, 54.0% agreed with a lack of appreciation for his/her efforts, and 45.0% agreed with conflict between nurses and doctors.

Regarding technical support challenges, it was observed that 51.0% agreed with lack of availability of beds, examination rooms, some equipment, and medicines, and finally 60.0% agreed with lack of appropriate offices for nurses, 49.0% agreed with the presence of some high-tech devices that exceed their abilities and cognitive skills, 48.0% agreed with the unavailability of a chance to introduce your abilities and skills, and 52.0% agreed with a working atmosphere filled with tension and stress.

Table (2.b): Shows nurses' challenges regarding infection prevention of central venous catheters. Regarding sense of responsibility challenges, it was found that 66.0% agreed with a sense of responsibility for some critical cases, 35.0% agreed with not specifying the duties and responsibilities of nursing, and 41.0% agreed with the lack of support from superiors at work. Regarding role conflict challenges, it was observed that 45.0% agreed that family life is risked by the choice of nursing profession, 56.0% agreed with instability in family life due to increased working hours and night shifts, and 62.0% agreed with receiving professional training and knowledge of how to handle critical situations.

Figure (1): Illustrates the distribution of total score levels of nurse's challenges regarding infection prevention of CVC. It was found that 39.0% of nurses were poor regarding challenges for infection prevention of central venous catheters, 28.0% were

fair, 12% were good, and 21.0% were very good, with a mean ± SD of 32.5 ± 10.5.

Figure (2): Shows the total score of nurses' practices; it was found that 54.0% of nurses had unsatisfactory practice regarding critical care nurses` practice of CVC, but 46.0% had satisfactory practice.

Table (3): Shows relations between total score levels of nurses' challenges categories regarding infection prevention of central venous catheter and demographic characteristics. It was found that there was significant relationship between total challenges score regarding infection prevention of CVC with hospital setting, educational qualification and attendance of previous training (as infection control seminars and guideline booklets) with same (P-Value =.001*).

Table (4): Shows relations between total score levels of nurses` practice observational checklist and demographic characteristics. It was found that there was a significant relationship between the total practice score regarding infection prevention of CVC with age group, gender, hospital setting, educational qualification, and attendance of previous training with (P-Value = .001*, .004*, .001*, .001*, & .001*), respectively.

Discussion:

A major challenge related to complexity of ICU nurses' central venous catheter (CVC) access procedure compliance with prevent infection from a different perspective than previous research. The individualized nursing practice and risk delineate barriers hindering the use of the evidence-based procedure when accessing CVCs. (**Morris & Jakobsen, 2022)**

Central line-related infections in critically ill patients are potentially fatal infections and are associated with a substantial increase in long hospital stays and total hospital costs. Nosocomial infections are preventable by adherence to procedures and policies designed to limit the spread of infection between patients and between ICU staff and patients **(Mohammed et al., 2021).**

Finding of the current study demonstrated the demographic data of the critical care nurses. Regarding age, it was found that the mean & standard deviation were around thirty years, and more than fifty percent of the studied nurses were aged from 20 to 29 years. This result agrees with **Awad et al. (2020),** who agree with the result and reported that the age group ranged between 25 and 39 years. However, this result disagrees with **Esposito et al. (2021),** who found that the mean & standard deviation for the age of nurses is about forty-three years.

Also, **Atia (2020)** documented that the majority of the studied nurses were less than 40 years of age. Another research study supported by **Muschitiello et al. (2024)** found that nurses aged 41–50 years. These results may be attributed to work overload, choosing young age from nurses to enable doing hard work in an ICU setting.

Concerning gender, it was observed that a majority of nurses were female, while male nurses were nearly thirty percent. These results may be related to the majority of students admitted to study nursing being female in the secondary school of nursing. This result agrees with **Esposito et al. (2021),** who found that approximately two-thirds of nurses were females. Also, this result agrees with **Atia, 2020,** who documented that the majority of the studied nurses were females.

Regarding marital status, it was found that half of nurses were single. These results disagree with **Alqalah, 2024,** who documented that more than half of nurses were married. These results may be attributed to different sample sizes and settings. As regards educational qualifications, it was found that less than fifty percent had bachelor's degrees, and most had secondary nursing diploma degrees. This result agrees with **Awad et al. (2020),** who found that most nurses had a secondary nursing school diploma. However, this result disagrees with **Atia, 2020,** who reported that more than fifty percent of nurses had a bachelor's degree in nursing.

Concerning, nurses' years of experience, it was found that the majority of nurses had years of experience ranged from 1 to 5 years of experience. this result agreement with **Atia, 2020** who documented that less than fifty percent of the nurses had 2-5 years of experience. However, **Muschitiello et al., 2024** who documented that the majority of nurses had more than 10 years' work experience. These results may be attributed to different sample size and setting.

However, this result disagreement with **Morris et al., 2022** who documented that the average nurse` years of experience in specialist care was more than 12 years. Another study research supported with **Awad et al., 2020** who found that nurse` years of experience ranged from 5 - 15 years with a mean & standard deviation about 2.52±1.2. These results may be attributed to different sample size and setting.

Regarding to Attendance of previous training, it was found that more than half of nurses attend infection control seminars. This may be due to health care setting in Egypt had special fund for training.

This result agrees with **Awad et al. (2020).** Who reported that the majority of nurses attended previous training programs on infection control? This result may be due to the healthcare setting in Egypt having a special fund for training.

The findings of the current study demonstrated that workload and psychological challenges are the most challenging faced by critical nurses regarding the infection prevention of central venous catheters. These results may relate to the majority of nurses reporting several contributing challenges regarding central venous catheter infection that included high workloads, staffing shortages, and limited access to necessary equipment. Deficiencies in compliance and reporting factors also contribute to an increased risk of infection.

This results agreement with **Cameron et al., 2021** who found that the most of challenges factor influencing the prevention of central venous catheter included stressed that the evidence must be aligned with patient needs and seamlessly integrated into clinical environments. Work overloud, psychological stress, Certain occurrences, rendered some recommendations impracticable. Without careful adaptation, the direct application of recommended practices could present frontline nurses with considerable obstacles, shortages in numbers of nursing staff, leading to a loss of motivation.

Current study, it was found that nearly forty percent of nurses levels of total score had a poor level regarding challenges for infection prevention of central venous catheters; nearly thirty percent were fair, a low percentage were good, and twenty percent were very good. This result may be due to challenges that face critical care nurses, such as work overload, psychological stress, technical support, and a sense of responsibility.

This results ingreement with **Alqalah, 2024** who found that twenty five percent from nurses had poor challenges for infection prevention of central venous catheter. However, **Awad et al., 2020** who documented that the great majority of nurses had poor challenges regarding central line care infection. Another research result documented by **Yang et al., 2024** who observed that five challenges factors that prevent central venous catheter infection as shortage equipment, personnel/staff, setting or organizational context, patient or provider, and time-related barriers.

This result contrasts with **Van et al. (2021),** who found that the majority of nurses had many challenges that prevented central venous catheter infection, such as more complex responsibilities. Allowing more time for these intricate tasks rather than routine work would undoubtedly elevate the quality of post-insertion management for CVCs. These results may be attributed to different sample sizes and settings.

The present study demonstrated the relations between total score levels of nurses' challenge categories regarding infection prevention of central venous catheters and demographic characteristics. It was found that there was a significant relationship between the total challenges score regarding infection prevention of CVC with the hospital setting, educational qualification, and attendance of previous training (such as infection control seminars and guideline booklets) with the same (P-value =.001*). This results in disagreement with **Costa et al. (2020),** who found a significant negative correlation between challenges regarding infection prevention of CVC and years of experience and level of education with p. values of 0.005 and 0.039, respectively.

The present study demonstrated distribution of nurses according to practice observational checklist regarding care of central venous catheter. It was found that that more than fifty percent of nurses had unsatisfactory level of practice regarding critical care nurse's practice of CVC. These results may be attributed to nurses work loud, staff shortage, not adherence with infection control measures and, lack of documentation.

this result agreement with **Kim et al., 2024** who documented that the most of nurse's satisfactory level with Mean & standard deviation 4.64 ± 0.38 for the nurses' practice of CLABSI prevention. This results agreement with **Awad et al., 2020** who reported that the majority of nurses had unsatisfactory level of practice regarding care of central venous catheter infection. This result disagreement with **Muschitiello et al., 2024** who observed that nurse`s practices had satisfactory regarding care of central venous catheter.

Esposito et al., 2021 disagreement with the current study that found the majority from nurses had satisfactory practices about the prevention of CLABSIs Among the different activities related to the care of patients with CVC, the majority was involved in catheter site care.

Conclusion:

Considering the results of the study, it is possible to emphasize the following conclusions: In this study, most of the critical care nurses nearly forty percent of nurses-were poor regarding challenges for infection prevention of central venous catheters; nearly thirty percent were fair, a low percentage were good, and twenty percent were very good. It was found that more than fifty percent of nurses had unsatisfactory practice regarding critical care nurses' practice of CVC, with a mean ± SD of 25.9 ± 8.3. There was a significant relationship between total practice score regarding infection prevention of CVC with age group, gender, hospital setting, educational qualification, and attendance of previous training with P-values of.001*,.004*,.001*,.001*, &.001*, respectively.

Recommendations:

- Performing scientific research concentrated on nurses` challenges regarding central venous catheter prevent infection at Egypt and to give different findings.
- Makers of health policy must develop strategies that increase readiness of the institutions to apply infection control, increase the abilities of nurses to appropriate apply of universal precautions in central venous catheter prevent infection through well trained.
- Preparing training programs for ICU nurses to inform them of the possible challenges central venous catheter infection prevention.
- Reapply this research on a large sample size acquired from different geographical areas in Egypt for generalization

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