Assessment of Nursing Knowledge and Compliance regarding Central Line Associated Blood Stream Infection in Neonatal Intensive Care Unit (NICU)

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Abstract

Background: Hospital-acquired infections are a significant concern in neonatal intensive care units due to newborns' immature immunity and frequent invasive procedures, with central line–associated bloodstream infection (CLABSI) being one of the most serious complications. **Aim of the study:** To assess nurses' knowledge and compliance regarding central line associated blood stream infection in neonatal Intensive Care Unit (NICU). **Research design**: A descriptive study design was used in this study. **Setting**: The study was conducted at Al Galaa Military Medical Complex. **Sample:** Convenience sample of 60 nurses working in Neonatal Intensive Care Unit (NICU) at Al Galaa Military Medical Complex. **Tools**: Data was collected by using 2 tools: Tool I: self-administrated questionnaire that consists of 2 main parts as follow: 1st part: Demographic data sheet of studied nurses, and 2nd part: is Knowledge assessment questionnaire. Tool II: observational checklist. **Results**: The study result revealed that, more than half (53.3%) of studied nurses had average level of knowledge, and 30% had good level of knowledge, while 16.7% had poor level of knowledge. Also, 58.3% of studied nurses had adequate level of compliance while 41.7% had inadequate level of compliance. There was highly statistically significant relation between nurses' knowledge, and practices. **Conclusion**: The study showed that over half of nurses had average knowledge of CLABSI prevention in NICUs, nearly one-third had good knowledge, and fewer had poor knowledge. More than half demonstrated adequate compliance, while some showed inadequate adherence. **Recommendation:** Implement regular educational programs and workshops focusing on evidence-based CLABSI prevention protocols tailored to NICU settings.

Keywords: Assessment, Nursing, Knowledge, Compliance, Central Line Associated Blood Stream Infection, Neonatal Intensive Care Unit (NICU)

Introduction

In the neonatal intensive care unit (NICU), infection control is a top priority due to the heightened vulnerability of neonates. Newborns, especially preterm infants, have immature immune systems, underdeveloped skin barriers, and reduced physiological reserves, making them more susceptible to infectious agents. The NICU environment, with its high dependency on advanced technology and frequent invasive interventions, increases the risk of pathogen transmission from both endogenous and exogenous sources. Infections in this setting can lead to severe complications, long-term disabilities, and higher mortality rates **(Johnson et al., 2021).**

The causes of infections in NICUs are multifactorial. Endogenous infections arise from the neonate's own flora when their natural defenses are compromised, whereas exogenous infections are acquired through contact with contaminated medical devices, healthcare workers' hands, or environmental surfaces. The frequent use of invasive procedures such as endotracheal intubation, urinary catheterization, and particularly central venous catheterization, provides a direct pathway for microorganisms to enter the bloodstream. These factors create a clinical setting where meticulous infection prevention is vital **(Al Bakoush et al., 2023).**

Central venous catheters (CVCs), also referred to as central lines, are essential devices in NICUs for administering medications, fluids, parenteral nutrition, and for blood sampling. Despite their benefits, central lines are associated with a range of complications, including mechanical injury, thrombosis, catheter occlusion, and infections. Among infectious complications, central line–associated bloodstream infection (CLABSI) is the most critical. CLABSI is defined as a laboratory-confirmed bloodstream infection in

a patient who had a central line in place within 48 hours before the onset of infection, with no other identifiable source. This condition is associated with prolonged hospitalization, increased healthcare costs, and high mortality rates in neonates **(Wendel et al., 2021).**

The pathogenesis of CLABSI involves microbial colonization of the catheter either via the insertion site, contaminated hub, or hematogenous spread from another infection focus. Risk factors for CLABSI in neonates include prolonged catheterization, improper insertion technique, inadequate maintenance practices, and failure to adhere to strict aseptic protocols. Evidence-based guidelines emphasize preventive measures such as hand hygiene, maximal barrier precautions during insertion, use of chlorhexidine for skin antisepsis, and routine assessment of the need for continued catheterization **(Sikka et al., 2024).**

Nurses are central to the prevention and management of CLABSI in NICUs. Their role extends from ensuring aseptic insertion and maintenance of central lines, to performing daily catheter site inspections, changing dressings at recommended intervals, and following standardized flushing and locking protocols. They are also responsible for early detection of infection signs, prompt reporting to the healthcare team, and patient and family education regarding infection prevention **(Badparva et al., 2023).**

Significance of the study

In neonatal intensive care units (NICUs), a systematic review and meta-analysis reported that nosocomial infections occur in about 30% of cases, contributing to as much as 40% of neonatal deaths in developing countries ***(Li & Qian, 2023).*** An international surveillance study reported that the rate of central line–associated bloodstream infection (CLABSI) in neonatal intensive care units across Latin America, Asia, Africa, and Europe was approximately 6.1 cases per 1000 central line–days ***(Kelada et al., 2023).***

In Egypt, A 12-month descriptive surveillance study found that 21.4% of neonates developed nosocomial infections, with an overall rate of 13.8 infections per 1000 bed-days. Among these, 8.8% were bloodstream infections ***(Mohamed & Abd-Elmawgood, 2021).*** Although NICU-specific data on central line–associated bloodstream infection (CLABSI) in Egypt are limited, national surveillance across Egyptian ICUs covering neonatal, pediatric, and adult units has shown CLABSI rates ranging from 2.6 to 60 per 1000 central line-days in neonatal units in developing countries, including Egypt ***(Alshehri, 2025).***

Therefore the aim of the study is to assess nurses' knowledge and compliance regarding central line associated blood stream infection in neonatal Intensive Care Unit (NICU).

Aim of the Study

To assess nurses' knowledge and compliance regarding central line associated blood stream infection in neonatal Intensive Care Unit (NICU) through:

- To assess nurses' knowledge regarding central line associated blood stream infection in neonatal Intensive Care Unit (NICU).
- To evaluate nurses' compliance regarding central line associated blood stream infection in neonatal Intensive Care Unit (NICU)

Research questions

- Q1: What is the level of nurses' knowledge regarding central line associated blood stream infection in neonatal Intensive Care Unit (NICU)?
- Q2: What is the level of compliance regarding central line associated blood stream infection in neonatal Intensive Care Unit (NICU)?students' level of clinical practice skills?

Subjects and methods

1-Research design

A descriptive study design was utilized in this study.

2-Study Settings:

This study was conducted in Al Galaa Military Medical Complex

3-Study Sample

A convenience sample of 60 nurses worked in Neonatal Intensive Care Unit (NICU) Al Galaa Military Medical Complex

Inclusion Criteria

- Nurses worked in Neonatal Intensive Care Unit (NICU) for 6 months.

Exclusion Criteria

- Nurses worked in Neonatal Intensive Care Unit (NICU) for 6 months.

Tools for data collection:

Two tools were used for data collection.

Tool I: A self-administrative questionnaire

This tool are made up of the following two parts:

1st Part: demographic data sheet, it include the following (age, sex, educational level, years of experience, and previous training in Neonatal Intensive Care Unit (NICU).

2nd Part: Knowledge assessment questionnaire: It was adopted from **(Mahmoud et al., 2021)** to assess nurses' knowledge regarding central line associated blood stream infection in neonatal Intensive Care Unit (NICU). It is consist of 22 questions about insertion and maintenance bundles causes, signs and symptoms of infection, complications of central line and nursing management.

Scoring system:

Each of which can be answered with "correct" or "incorrect" a score of 1 is awarded for each correct response, while a score of 0 is awarded for each incorrect response. The score was interpreted as

- ≤ 50% = poor level of knowledge,
- 51–75% = average level of knowledge,
- > 75% = good level of knowledge.

Tool II: Observational checklist

It was adopted adopted from **Association for Professional in Infection Control and Epidemiology (APIC) Guidelines (2014)** to assess central line associated blood stream infections bundle compliance of nurses. The observational checklist had 2 parts regarding insertion (6 items) and maintenance (8 items) that the nurses should follow to prevent central line associated blood stream infections.

Scoring system:

Participants were asked to respond to each item which: 0 = not done, 1 = done. The total score was converted to a percentage. The score was interpreted as

- "Compliance" if score more than 80%
- "Non-compliance" if scores less than 80%.

Pilot study:

A Pilot study was conducted on 10% (6 nurses) of the sample under study to test feasibility and applicability of the study tools, obtain results was used as a guide to reconstruct the change needed in data collection tools..

Ethical considerations:

An Official permission from the Scientific Research Ethics Committee of the Military Medical Academy was obtained. Participation in the study was voluntary and subjects given complete full information about the study and their role before signing the informed consent. The ethical considerations included explaining the purpose and nature of the study, stating the possibility to withdraw at any time, confidentiality of the information where it was not accessed by any other party without taking permission of the participants. Ethics, values, culture and beliefs were respected.

Statistical Analysis

Data was collected and subjected to statistical analysis. The mean value and the standard deviation (SD) of measured parameters were calculated using the Statistical Package for the Social Sciences (SPSS) statistical program version 27 (IBM Inc., Chicago, Illinois, USA). Comparison between the studied groups was performed using an independent samples t-test, and correlation between different scores using the Pearson correlation test (r). P value < 0.05 was considered significant.

Results

Sixty nurses were participated in this study.

Table (1) shows that, 53% of the studied nurses were aged from 18 to –22 years, with a mean age of 24.28±4.35 years. Nearly three fourth (73.3%) were female. According to

educational level, the result reveals that 90% had a diploma degree in nursing, and 10% had bachelor's degree in nursing. Concerning years of experience, 65% of the nurses had 0–5 years of experience. The majority of nurses (96.7%) had received previous training courses in the NICU.

Figure 1 demonstrates that, more than half (53.3%) of studied nurses had average level of knowledge, and 30% had good level of knowledge, while 16.7% had poor level of knowledge.

Figure 2 illustrates that, 58.3% of studied nurses had adequate level of compliance while 41.7% had inadequate level of compliance.

Table 2 shows that**,** there was highly statistically significant relation between nurses (education level, and years of experience) and their level of knowledge, with (P = < 0.000).

Table 3 illustrates that, there was highly statistically significant relation between nurses (age, and years of experience) and their level of practice, with (P = < 0.000).

Table 4 demonstrates that, there was highly statistically significant relation between nurses' knowledge, and practices regarding central line associated blood stream infection in neonatal intensive care unit (NICU), with (P = < 0.000).

Table (1): Frequency and percentage distribution of socio-demographic characteristics among studied nurses (N= 60).

Characteristics	No.	%
Age		
✓ 18- 22years	27	45.0
✓ >22- 26years	18	30.0
✓ >26- 30years	13	21.7
✓ More than 30 years	2	3.3
Mean ± SD:	24.28±4.35	
Gender		
✓ Male	16	26.7
✓ Female	44	73.3
Educational level		
✓ Diploma degree in nursing	54	90.0
✓ Bachelor's degree in nursing	6	10.0
Years of experience		
✓ 0-5 years	39	65.0
✓ > 5-10 years	21	35.0
Pervious training course in NICU		
✓ Yes	58	96.7
✓ No	2	3.3

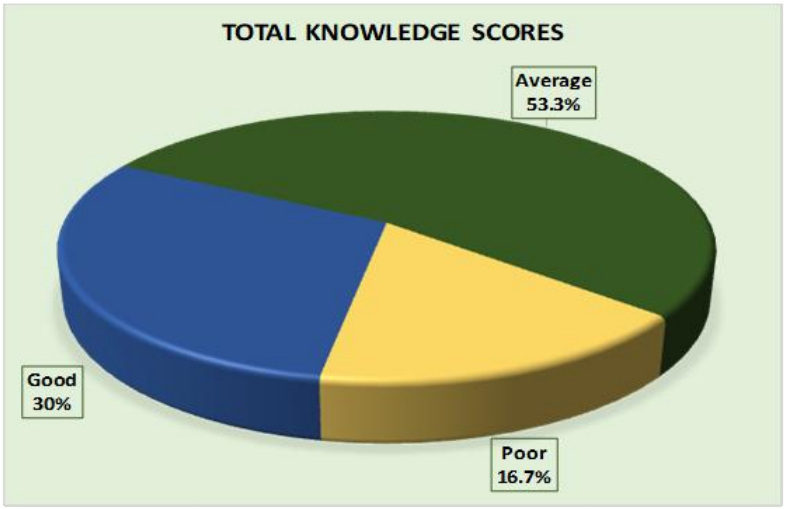

Figure (1): Figure (1) percentage distribution of total knowledge score regarding central line associated blood stream infection in neonatal intensive care unit (NICU) among nurses of studied nurses (N=60).

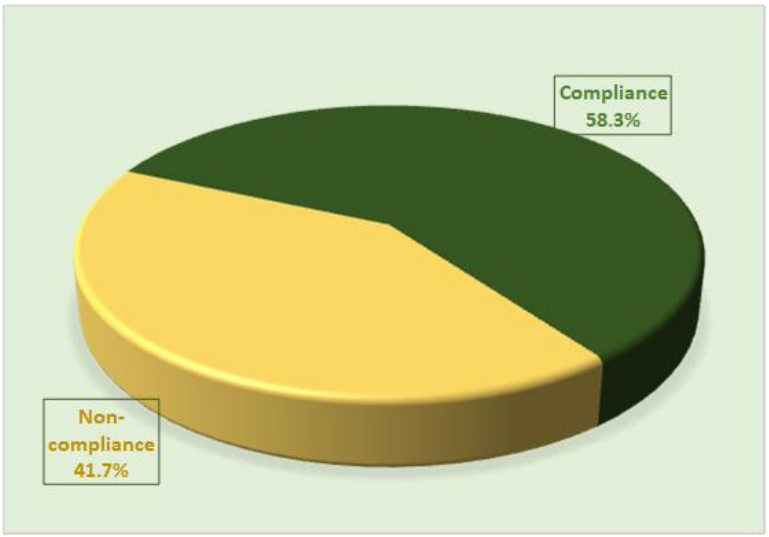

Figure (2) percentage distribution of total compliance scores regarding central line associated blood stream infection in neonatal intensive care unit (NICU) among nurses of studied sample (N=60).

Table (2): Relation between nurses knowledge and their demographic characteristics (n=60).

Demographic characteristics	Nurses knowledge						χ^2	P
	Good		average		Poor			
	N	%	N	%	N	%		
Age								
✓ 18- 22years	8	13.3	15	25.0	4	6.7	0.653	0.721
✓ >22- 26years	5	8.3	10	16.7	3	5.0		
✓ >26- 30years	4	6.7	6	10.0	3	5.0		
✓ More than 30 years	1	1.7	1	1.7	0	0.0		
Gender								
✓ Male	5	8.3	8	13.3	3	5.0	0.863	0.353
✓ Female	13	21.7	24	40.0	7	11.7		
Education levels								
✓ Diploma degree in nursing	15	25.0	31	51.7	8	13.3	83.6	0.000**
✓ Bachelor degree in nursing	3	5.0	1	1.7	2	3.3		
Years of experience								
✓ 0-5 years	12	20.0	21	35.0	6	10.0	47.8	0.000**
✓ > 5-10	6	10.0	11	18.3	4	6.7		
Pervious training course in ICU								
✓ Yes	18	30.0	32	53.3	10	16.7	0.979	0.327
✓ No	0	0.0	1	1.7	1	1.7		

Table (3): Relation between nurses practice and their demographic characteristics (n=60).

Demographic characteristics	Nurses practice				χ^2	P
	Compliance (35)		Non- compliance (25)			
	N	%	N	%		
Age						
✓ ≤ 20 years	14	23.3	13	21.7	11.69	0.000**
✓ >20–30 years	12	20.0	6	10.0		
✓ >30–40 years	8	13.3	5	8.3		
✓ >40 years	1	1.7	1	1.7		
Gender						
✓ Male	11	18.3	5	8.3	0.391	0.534
✓ Female	24	40.0	20	33.3		
Education levels						
✓ Diploma degree in nursing	30	50.0	24	40.0	0.733	0.392
✓ Bachelor degree in nursing	5	8.3	1	1.7		
Years of experience						
✓ 0-5 years	19	31.7	20	33.3	51.7	0.000**
✓ > 5-10	16	26.7	5	8.3		
Pervious training course in ICU						
✓ Yes	35	58.3	23	38.3	5.27	0.048
✓ No	0	0.0	2	3.3		

Table (4): Correlation between nurses knowledge, and practices (N=60).

	Knowledge		practice	
	r	p	r	p
Knowledge	-	-	0.741	0.000**
Practice	0.741	0.000**	-	-

Discussion

Central line–associated bloodstream infections (CLABSIs) are among the most serious healthcare-associated infections in neonatal intensive care units (NICUs). They occur when microorganisms enter the bloodstream through a central venous catheter, leading to severe complications such as sepsis, prolonged hospitalization, increased healthcare costs, and higher mortality rates in vulnerable neonates. Premature and critically ill infants are particularly at risk due to their immature immune systems and frequent need for long-term central venous **(Muller et al., 2023).**

Regarding age, the current study showed that more than half of the studied nurses were between 18 and 22 years old, with a mean age of 24.28±4.35 years. It may be due to recruitment patterns in neonatal intensive care units (NICUs) in Egypt, which often prioritize younger nurses who are newly graduated, physically active, and adaptable to high-stress environments.

These findings are in line with **Muschitiello et al. (2025)** in the study titled "Nurses' knowledge, attitudes, and practices on CLABSI prevention in the Neonatal Intensive Care Unit" in Italy, who reported that more than half of the nurses were in their early twenties. Conversely, **Ezike et al. (2021)** in the study titled "Infection control practices among nurses working in neonatal intensive care units (NICU) of two selected tertiary hospitals" in Nigeria, found that two-thirds of NICU nurses in their study were above 25 years old, possibly due to higher staff retention rates and fewer new graduates entering the pediatric field.

According to gender, the present study found that nearly three-fourths of the nurses were female. It may be due to the fact that nursing in Egypt remains a female-dominated profession, especially in NICU settings, due to cultural and societal perceptions of caregiving roles. This result is consistent with **Farag et al. (2024)** in the study titled "Enhancement of Nurses' Performance Regarding Care of Newborns at NICUs " in Egypt, who found that the majority of NICU nurses were female, attributing it to the predominance of women in the nursing workforce.

As regard educational level, the findings of the current study revealed that the majority of nurses had a diploma degree in nursing, while only a small minority held a bachelor's degree. It may be due to the fact that diploma graduates represent the largest nursing workforce segment in Egypt, and many hospitals, especially public facilities, continue to hire them in larger numbers due to lower salary requirements compared to bachelor's degree holders.

This finding aligns with **Saltah & Abusaad (2021)** in the study titled "Assessment of Nurses Knowledge and Practice about Peripherally Inserted Central Catheters at Neonatal Intensive Care Units" in Egypt, who found that more than three-fourths of NICU nurses held diploma degrees. However, **Khalil & Radha Aziz (2024)** in the study titled "The relationship between nurses' clinical competencies and burnout in neonatal intensive care units" in Egypt, reported that the majority of nurses in private NICUs had bachelor's degrees, which they attributed to stricter recruitment criteria and emphasis on advanced qualifications.

Concerning years of experience, the present study revealed that nearly two-thirds of the nurses had 0–5 years of experience. It may be due to the tendency of many Egyptian healthcare institutions, particularly NICUs, to recruit newly graduated nurses who are more adaptable to new technologies and protocols, as well as lower in salary cost compared to experienced staff.

This finding agrees with **Hendy et al. (2020)** in the study titled "Nursing Competency for Caring of High-Risk Neonates at Neonatal Intensive Care Unit" in Egypt, who reported that more than half of their NICU nursing staff had less than five years of work experience. On the contrary, **Mendes et al. (2021)** in the study titled "Adherence of the nursing team to patient safety actions in neonatal units" in Brazil reported that the majority of their participants had more than five years of NICU experience, likely reflecting lower turnover in their study setting.

Regarding previous training courses, the results of the present study showed that the majority of nurses had received previous training in the NICU. It may be due to the increased emphasis in Egyptian hospitals on in-service

education programs, particularly in critical care areas like NICUs, where adherence to infection control measures such as CLABSI prevention is essential for patient safety. This result is supported by **Abou El Fadl et al. (2023)** in the study titled "Assessment of neonatal intensive care unit nurses' compliance with standard precautions of infection control and identification of enabling factors" in Egypt, who found that more than three-fourths of their nurses had attended formal training sessions related to infection control and neonatal care.

Conversely, **Shibiru et al. (2023)** in the study titled "Clinical Competence of Nurses and the Associated Factors in NICU of Public Hospitals" in Ethiopia, that noted that less than half of their studied nurses had received formal NICU-specific training, possibly due to lack of structured educational programs in their study setting.

As regard the overall level of knowledge about central line-associated bloodstream infections (CLABSI), the current study revealed that more than half of the studied nurses had an average level of knowledge, nearly one-third had a good level of knowledge, while less than one-fifth had a poor level of knowledge. It may be due to the fact that most of the nurses had received previous training courses in the NICU, which improved their awareness; however, the variation in knowledge levels may be attributed to differences in educational qualifications, years of experience, and opportunities for continuous professional development.

This finding agrees with **Badparva et al. (2023)** in the study titled "Prevention of central line-associated bloodstream infections: NICU nurses' knowledge and barriers" in Iran, who reported that more than half of nurses demonstrated an average level of knowledge and less than one-third had good knowledge. Similarly, **Almalki et al. (2023)** in the study titled "Assessment of knowledge, attitude, and adherence to national guidelines for preventing central line-associated bloodstream infections among NICU nurses" in Jeddah, Saudi Arabia, found that about one-third of NICU nurses had good knowledge, while the rest ranged from average to poor.

Regarding the level of compliance, the present study found that more than half of the studied nurses had an adequate level of compliance with central line-associated bloodstream infection (CLABSI) prevention measures, while less than half had an inadequate level of compliance. It may be due to the presence of regular infection control training, the availability of personal protective equipment, and continuous supervision in the NICU, which encourage adherence to protocols.

This result is in agreement with **Mahieu et al. (2022)** in the study titled "Compliance with international prevention guidelines for central-line-associated bloodstream infections in neonatal intensive care units" in Belgium, who reported that more than half of nurses demonstrated adequate compliance, attributing this to structured training programs. Similarly, **Quadros et al. (2022)** in the study titled "Evaluation of Nurses' Adherence to Central Line Care Bundles" in Brazil, found that nearly two-thirds of nurses had adequate compliance levels.

On the other hand, **Tripathi et al. (2023)** in the study titled "Compliance With Central Line Maintenance Bundle and Infection Rates in NICU" in USA, found that less than one-third of nurses achieved adequate compliance, citing factors such as work overload, shortage of supplies, and lack of updated training as reasons for the low adherence.

According to the relationship between education level and nurses' knowledge, the current study showed a highly statistically significant association between higher educational attainment and improved knowledge scores regarding central line-associated bloodstream infection (CLABSI) prevention. It may be due to the fact that advanced nursing education provides a deeper theoretical background and broader exposure to infection control guidelines, evidence-based practices, and clinical decision-making skills.

This finding agrees with **Alqaissi (2025)** in the study titled "Nurses' Knowledge and Behavior in Hospitals Regarding the Prevention of Central Line-Associated Bloodstream Infections" in Jordan, who reported that more than two-thirds of bachelor's-prepared nurses demonstrated high knowledge levels, compared to less than one-third of diploma nurses.

Similarly, **Emad et al. (2021)** in the study titled " Nursing Knowledge and Compliance

regarding Central Line Associated Blood Stream Infection Bundle in Neonatal Intensive Care Units " in Egypt, found that nurses with higher education achieved better knowledge scores, emphasizing the role of academic preparation in promoting safe practice. In contrast, **Badparva et al. (2023)** in the study titled "Prevention of central line-associated bloodstream infections: NICU nurses' knowledge and barriers" in Iran, found no significant relationship between educational level and knowledge, suggesting that continuous in-service training and skill reinforcement may outweigh formal academic qualifications in sustaining up-to-date knowledge.

As regard the relationship between years of experience and nurses' knowledge, the current study demonstrated a highly statistically significant association between longer clinical experience and higher knowledge scores regarding central line-associated bloodstream infection (CLABSI) prevention. It may be due to the fact that nurses with more years of experience are exposed to a wider range of clinical cases, repeated practice opportunities, and informal learning from colleagues, which collectively enhance their understanding of infection control protocols.

This finding is supported by **Sham et al. (2023)** in the study titled "Intensive care nurses' knowledge, practice and attitude in prevention of central line-associated bloodstream infection" in Malaysia, who reported that nearly three-fourths of nurses with over five years of ICU experience had high knowledge levels, compared to less than one-third of those with under two years.

Also, **Manzo et al. (2022)** in the study titled "Knowledge and practices for central line infection prevention among Brazilian nurses" found that experienced nurses scored significantly higher in knowledge assessments, attributing this to frequent exposure to central line procedures and complication management. Conversely, **Shahbaz et al. (2024)** in the study titled "Knowledge and practice of nurses regarding central line-associated bloodstream infection and prevention" in Pakistan, reported no significant relationship between years of experience and knowledge level, suggesting that without ongoing training, years in service alone may not ensure updated clinical knowledge.

Concerning the relationship between age and nurses' level of practice, the current study revealed a highly statistically significant association, where older nurses demonstrated higher levels of compliance with central line-associated bloodstream infection (CLABSI) prevention practices compared to younger nurses. It may be due to the fact that with increasing age, nurses often gain greater clinical maturity, refined technical skills, and more confidence in adhering to protocols, which collectively improve their practice performance.

This result is consistent with **Matlab et al. (2022)** in the study titled "Knowledge and compliance to prevention of central line-associated blood stream infections among nurses" in Jordan, who found that more than two-thirds of nurses aged over 30 years had high compliance levels, compared to less than half of those aged under 25 years. On the other hand, **Mahieu et al. (2022)** in the study titled "Compliance with international prevention guidelines for central-line-associated bloodstream infections in neonatal intensive care units" in Belgium, found no significant correlation between age and practice level, suggesting that ongoing in-service training and institutional protocols can standardize performance regardless of age.

Regarding the relationship between years of experience and nurses' level of practice, the current study showed a highly statistically significant association, with nurses who had longer years of experience demonstrating higher compliance levels with central line-associated bloodstream infection (CLABSI) prevention protocols compared to those with fewer years in practice. It may be due to the fact that prolonged clinical exposure allows nurses to repeatedly perform central line care procedures, gain confidence in aseptic techniques, and develop critical thinking skills for infection prevention.

This finding is in agreement with **Abou El Fadl et al. (2023)** in the study titled "Effect of Experience on Nurses' Compliance with Central Line Care in Neonatal Intensive Care Units" in Egypt, where more than three-fourths of nurses with over five years of experience achieved adequate compliance scores compared to only one-third of those with less than two years. Conversely, **Indarwati et al. (2022)** in the study titled "Nurse knowledge and confidence on

peripheral intravenous catheter insertion and maintenance in pediatric patients" in Australia, found no significant relationship between years of experience and compliance, explaining that standardized training programs and strict supervision could equalize the performance of both novice and experienced nurses.

Regarding the relationship between nurses' knowledge and their practices regarding central line-associated bloodstream infection (CLABSI) in the neonatal intensive care unit (NICU), the current study revealed a highly statistically significant association, indicating that higher knowledge levels were strongly linked with better compliance in practice. It may be due to the fact that a solid theoretical understanding of CLABSI prevention protocols enhances nurses' ability to apply correct aseptic techniques, recognize early signs of infection, and follow evidence-based guidelines consistently.

This finding is in line with **Emad et al. (2021)** in the study titled "Nursing Knowledge and Compliance regarding Central Line Associated Blood Stream Infection Bundle in Neonatal Intensive Care Units" in Egypt, where nearly three-fourths of nurses with good knowledge demonstrated adequate practice, compared to only one-fourth of those with poor knowledge. Conversely, **Abdelhakem (2024)** in the study titled "Assessment of Nurses' Performance Regarding Factors Contributing to Complication of Peripheral Vascular Access Device in Neonatal Intensive Care Unit" in Egypt, found that despite high knowledge scores, some nurses still failed to maintain optimal practice, attributing the gap to workload pressure, inadequate resources, and lack of periodic competency assessment..

Conclusion:

Based on the current study's findings, it can be concluded that More than half of nurses in the NICU had an average level of knowledge about preventing and managing CLABSI, while about one-third showed good knowledge. More than half demonstrated adequate compliance, though some showed inadequate adherence. Significant associations were found between knowledge and factors such as education, experience, and age, as well as between knowledge and compliance.

Recommendations:

Based on the current study's findings, the researcher recommended

- Implement regular educational programs and workshops focusing on evidence-based CLABSI prevention protocols tailored to NICU settings.

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