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Introduction

Infection control methods are fundamental strategies for preventing healthcare-associated infections, applicable to all individuals, regardless of their potential or existing infectious status (Rajih & Mohammed, 2020). Neonates are uniquely susceptible to harm. Nosocomial infections are more common in premature neonates because their immune systems are still developing, they are born at a low weight or gestational age, they require

Determinants of Nurses' Compliance with Infection Control Protocols in NICUs: A Cross-Sectional Study in Iraq

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ABSTRACT

Objective: The study aims to assess nurses' level of compliance and the factors influencing their adherence to infection control precautions in neonatal intensive care units.

Method.

Methods and Materials: A Descriptive cross-sectional study was conducted in NICUs at specialist pediatric hospitals in Babylon Province. The study involved 150 nurses, sampled using a non-probability, convenience sampling process, and the data were collected through a self-report questionnaire reviewed by experts. A pilot study tested its reliability. Data analysis used both descriptive and inferential statistical methods with SPSS.

Findings: The findings revealed that the majority of nurses demonstrated a moderate level of compliance with infection control protocol. Both individual and organizational factors had a negative impact on nurses' compliance, and a significant association was found between these factors and nurses' age, sex, experience in the profession, and period of working in NICUs. A negative correlation was found between nurses' compliance and factors influencing their adherence to infection control precautions.

Conclusion: Overall, nurses' compliance regarding infection control was moderate. Younger female nurses worked the morning shift, with experience in the nursing profession of more than 5 years, and attended more training courses in infection control, demonstrating a higher compliance rate. Factors influencing nurses' compliance had a detrimental impact on their adherence to infection control protocols, with a significant effect on older female nurses with 6-10 years of experience in the NICU and limited overall experience in the nursing profession.

Keywords: Compliance, Nurses, Infection control, Neonatal intensive care unit.

intravascular catheters, other medical equipment, and extended hospital stays (Abou El Fadl et al., 2023). The establishment of the Neonatal Intensive Care Unit has provided numerous severely ill neonates with opportunities for treatment and survival. Nurses in sensitive areas, such as neonatal intensive care, require ongoing and repetitive training in infection control management and proper hand hygiene (Baran et al., 2023). The incidence of HAIs in hospitalized neonates is a complicated problem, as germs can be transmitted

among patients via healthcare workers (HCWs) and caregivers or by contamination of the hospital environment and equipment (Nyantakyi et al., 2024). Healthcare professionals must prioritize and comply with rigorous infection prevention and control protocols to ensure the safety of both patients and themselves (Lim et al., 2021). Adherence to standard precautions is influenced by several factors, including the adverse effects of equipment on nurses, workload, psychological considerations, nursing experience, and the influence of physicians (Zeb, 2019). Recently, institutional factor variables such as the availability and accessibility of safety equipment, management support for safe work practices, and the overall safety environment in the workplace have been receiving attention for their significant impact on safety performance. Staff shortages and insufficient training were identified as the primary reasons hindering compliance. Insufficient time for implementing standard precautions (work overload), limited resources, inadequate training, and insufficient managerial assistance in fostering a conducive work environment ("Compliance With Standard Precautions Guidelines and Associated Factors Among Nurses Working At Public Hospitals of Jimma Zone, South West Ethiopia," 2021. Consequently, to enhance adherence to standard precautions and eliminate factors that adversely affect compliance, significant behavioral modifications in nursing practice are necessary. Behavioral modifications may encompass a synthesis of education, motivation, and organizational alterations (Al-Faouri et al., 2021).

Objectives:

1. To assess nurses' level of compliance regarding infection control precautions in neonatal intensive care units.
2. To identify Factors Influencing Nurses' Compliance with Infection Control precautions.
3. To find out the association between nurses' compliance, factors influencing them, and specific socio-demographical data

Methods and Materials

Study Design and Participants

A descriptive, cross-sectional study design was conducted in neonatal intensive care units (NICUs) at specialist pediatric hospitals in Babylon Province.

The convenience sample consisted of 150 male and female nurses working in neonatal intensive care units, from both morning and night shifts, as all present were involved.

Instruments

Data were gathered via a self-reported questionnaire with three parts: first part to assess nurses demographic characteristics (age, gender, level of education, marital status, working shift, years of experience in nursing profession and in NICU, attendance training course in infection control), part two consist from 20 items developed by the WHO (Siam & Alreshidi, 2023) to assess level of nurses' compliance with infection control precautions, and third part constructed by researcher consist from two parts. The first part consists of 10 items to assess the effect of individual factors, and the second part includes 10 items to assess the effect of organizational factors on nurses' compliance with infection control precautions.

The data collection period spanned from December 6, 2024, to January 10, 2025. The data collection process was conducted using a self-report questionnaire. The first mission was to distribute the questionnaire to the nurses and instruct them to answer all questions without exception, emphasizing the importance of taking the necessary time to respond to the provided questions. The participants required approximately 20-25 minutes to complete the study's instruments.

Data Analysis

The collected data were analyzed using various statistical methods to obtain the study results electronically, employing the Statistical Package for the Social Sciences (SPSS) version 22 and Microsoft Excel 2010. Descriptive statistics were used to synthesize and summarize the data through measures such as mean, standard deviation (SD), frequency, and percentage. For inferential data analysis, Cronbach's alpha, Pearson's correlation coefficient (r), the Mann-Whitney U test, and the Kruskal-Wallis test were utilized.

Findings and Results

The average age of the nurses was 29.42 ± 6.185 years, with an average of 5.73 ± 3.53 years of experience in the nursing field. They had been working in the NICU

for an average of 3.12 ± 3.3 years, and the average number of training courses they attended was 1.44 ± 0.625 . In terms of demographics, 70% of the nurses were female, 53% were married, and 56% had a bachelor's degree. Also, 58.7% of the nurses worked night shifts.

The overall assessment of nurses' compliance level with infection control precautions was moderate, with a mean and standard deviation of 43.87 ± 5.21 .

The results show a highly significant association between nurses' compliance with nurses' sex and years of experience at P-value (0.007, 0.009), which are less than 0.01. Also, findings show a significant association between nurses' compliance with age, working shift, and number of courses at P-value (0.011, 0.032, 0.028), which is less than 0.05.

The overall score assessment of factors (individual and institutional) influencing nurses' compliance with infection control precautions showed a negative influence, with a mean and standard deviation of 37.63 ± 6.472 .

The results show a highly significant association between Factors' (individual and institutional) influence on nurse gender and Period of working in NICU at P-value (0.003, 0.001), which are less than 0.01. Also, this table shows a significant association between Factors' (individual and institutional) influence with age, and years of experience at P-value (0.034, 0.035), which is less than 0.05

Table 1

Overall score assessment of Factors' (individual and institutional) influence on nurse compliance with infection control precautions.

Main Domain	Rating	F	%	Minimum score	Maximum score	M.S	Std. Deviation	Ass
Factors influencing nurses' compliance	Negative influence	86	57.3	24	49	37.63	6.472	Negative influence
	Positive influence	64	42.7					
	Total	150	100					

Table 2

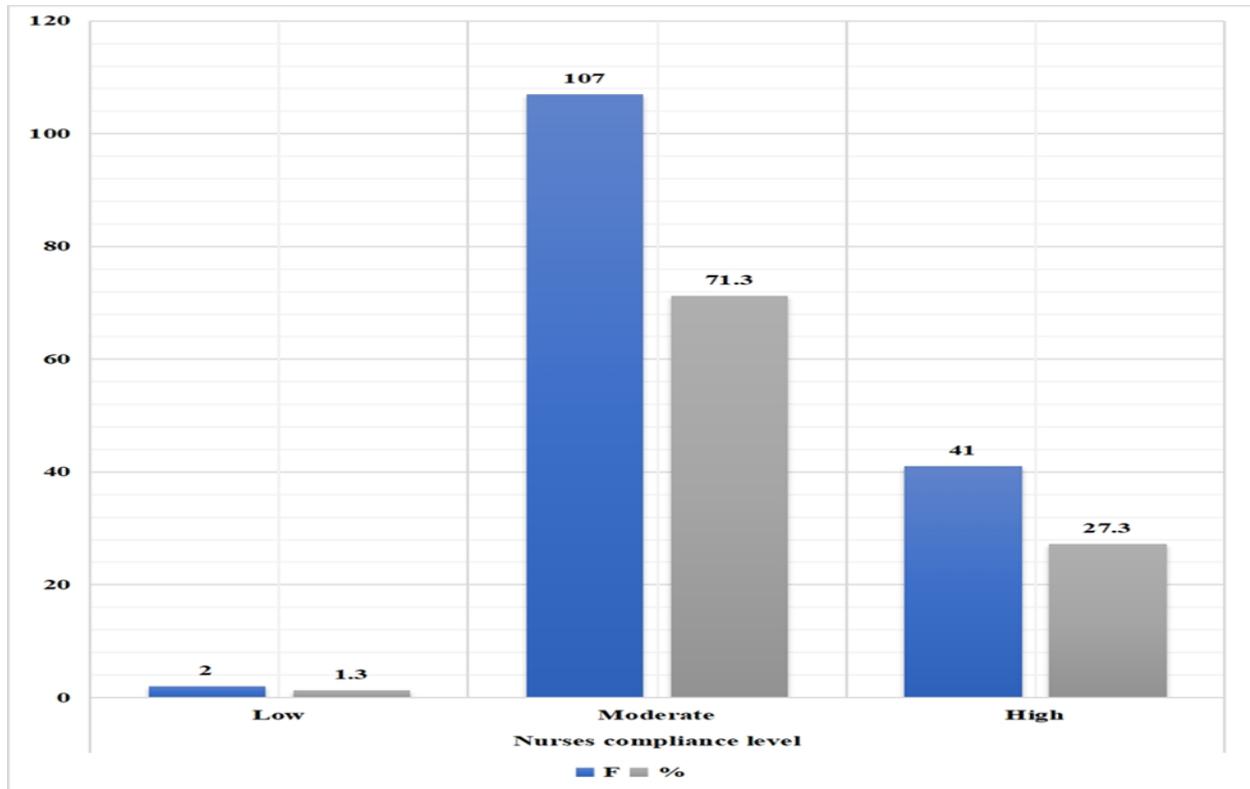
Correlation between nurses' compliance level and Factors influencing nurses' compliance with infection control.

		Nurses' compliance level with infection control	Factors influencing nurse compliance	Assessment
Nurses' compliance level with infection control	Pearson Correlation	1	- 0.349**	H.S
	Sig. (2-tailed)		0.001	Negative moderate correlation
	N	150	150	
Factors influencing nurse compliance	Pearson Correlation	- 0.349**	1	
	Sig. (2-tailed)	0.001		
	N	150	150	

** Correlation is significant at the 0.01 level (2-tailed).
N= sample size, H.S= high significant

Figure 1

Overall score assessment of Factors' (individual and institutional) influence on nurse compliance with infection control precautions.



Discussion and Conclusion

Neonates are uniquely susceptible to harm. Most babies generally require ventilator-assisted ventilation, and their immune systems are underdeveloped and vulnerable to infections. Therefore, NICUs should prioritize infection prevention as a top priority. Assessing the factors that affect nurses' adherence to infection control measures in the neonatal intensive care unit (NICU) is important for understanding how to maintain established protocols, identifying barriers to compliance, and finding opportunities for improvement. This is crucial for ensuring the protection of vulnerable newborns and improving overall healthcare outcomes in the NICU environment. The results demonstrated that nurses had a moderate level of compliance, as more than two-thirds of nurses in NICUs sometimes complied with infection control measures. The findings of this study align with a previous study that used the same scale, which revealed that overall nurse compliance with infection control protocols was not as high as required (Abou El Fadel et al., 2023; Bahegwa et al., 2022). The result of Kruskal-Wallis Test show that younger age, female

nurse who had more than five years of experience in nursing profession and had attended more training courses in infection control show higher compliance with infection control this can be attributed to nurses with more than five years of experience, having consistently engaged with infection control practices, tend to develop habitual compliance, which is further reinforced by participation in training programs. Moreover, younger nurses, motivated to demonstrate their competence, may contrast with older nurses who prioritize practical knowledge over rigid protocol adherence. This finding is supported by (Najm & Yasir, 2024). This suboptimal compliance can be attributed to several individual and organizational factors like knowledge and familiarity with infection control, fear about transfer infection to family or children, peer influence experience and confidence in skills, physician influence, the impact of equipment on nurses appearance, health condition like skin irritation, discomfort with PPE, also organizational factors such as the supervisor's role in enforcing compliance, the presence of an infection control committee, written infection control policies at the workplace, and the availability of regular, updated training courses

organized by the hospital all had a negative impact on nurses' ability to adhere to standard infection control precautions. This finding is supported by (Avero, 2022; Dotimi et al., 2022; George et al., 2023; Martins Souza et al., 2020).

These factors had a significant impact on older age female nurses with 6-10 years of NICU experience. This group of nurses is particularly vulnerable to experiencing burnout and psychological stress, as prolonged exposure to challenging environments makes them less adaptable and more reliant on established routines. In contrast nurses with less than 6 years of experience in nursing profession are notably affected by compliance-related factors due to their limited practical experience, which hinders their ability to adapt to changing conditions and protocol implementation in stressful situations. Additionally, the greater impact on female nurses' compliance may be attributed to their lack of professional support, the social and professional pressures they face, which complicate their ability to balance procedural adherence with management of these factors which supported by (Amsalu & Kassaye, 2022).

The result of Pearson Correlation shows that there is a negative correlation between the level of nurses' compliance and factors influencing their compliance, with a highly significant correlation at P-Value (0.001), which is less than 0.01. This type of negative correlation shows an interaction between personal and organizational factors that affect nurses' level of compliance with infection control. When these characteristics are combined with professional stress, insufficient training, and ineffective leadership, nurses' responses become more susceptible to influence, resulting in decreased adherence to preventive measures. Finding aligns with ("Compliance With Standard Precautions Guidelines and Associated Factors Among Nurses Working At Public Hospitals of Jimma Zone, South West Ethiopia," 2021. At the end of the study, based on the results achieved, it was found that both individual and organizational factors significantly affect nurses' compliance with infection control precautions in neonatal intensive care units. Finally, the alternative hypothesis was accepted based on the results: There is a significant association between nurses' compliance and the factors influencing them.

Overall, nurses' compliance regarding infection control was moderate. Younger female nurses worked the morning shift, with experience in the nursing profession of more than 5 years, and attended more training courses in infection control, demonstrating a higher compliance rate. Factors influencing nurses' compliance had a detrimental impact on their adherence to infection control protocols, with a significant effect on older female nurses with 6-10 years of experience in the NICU and limited overall experience in the nursing profession.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Declaration of Helsinki, which provides guidelines for ethical research involving human participants. Ethical considerations in this study were that participation was entirely optional. The study received all necessary approvals from relevant authorities. On December 1st, 2024, Issue No. 2014. All participants provided their oral and written consent prior to their involvement in the study and were informed about the objectives and purpose. They confirmed that the data collected would be protected and used exclusively for research purposes.

Transparency of Data

Following the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contribute to this study.

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