Original Research Article

Knowledge Regarding Kangaroo Mother Care among Nurses in Neonatal Intensive Care Units

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Abstract

Introduction: Kangaroo Mother Care (KMC) is an evidence-based intervention proven to reduce neonatal mortality by 36% and improve maternal-infant bonding. However, implementation remains inconsistent in low-resource settings like Palestine due to systemic barriers.

Objective: This study assessed KMC knowledge levels among neonatal intensive care unit (NICU) nurses in Palestinian governmental hospitals and identified predictors of knowledge.

Methods: A cross-sectional study surveyed 190 NICU nurses using a validated 20-item questionnaire (CVI = 0.92; $\alpha = 0.84$). Demographic variables included age, gender, education, work experience, and prior KMC training. Knowledge levels were categorized using Bloom's taxonomy (low: < 60%, moderate: 60–79%, high: ≥ 80%). Data were analyzed via descriptive statistics, t-tests, ANOVA, and multiple linear regression.

Results: The mean knowledge score was 56.8% (SD = 19.5), with 44.4% scoring low. Significant predictors included prior KMC training ($B = 16.656$, $p < 0.001$), higher education ($B = 6.365$, $p < 0.001$), and older age ($B = 9.934$, $p < 0.001$). Male nurses scored lower than females ($B = -4.852$, $p = 0.002$). The model explained 81.4% of variance ($R^2 = 0.814$).

Conclusion: Suboptimal KMC knowledge among Palestinian NICU nurses highlights the urgent need for structured training programs, curriculum integration, and policy reforms. Future research should address cultural and institutional barriers to improve implementation.

Keywords

Kangaroo mother care, neonatal intensive care unit, nurse knowledge, neonatal outcomes, training and education

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Introduction

Kangaroo Mother Care (KMC) is a globally recognized, evidence-based intervention that improves outcomes for preterm and low birth weight infants. It consists of prolonged skin-to-skin contact, exclusive breastfeeding, and early discharge, which contribute to reducing neonatal mortality by 36%, improving thermal regulation, and strengthening maternal-infant bonding (Boundy et al., 2016; Chan et al., 2016). Meta-analyses have confirmed its efficacy in preventing hypothermia, reducing nosocomial infections, and enhancing neurodevelopmental outcomes in newborns (Boundy et al., 2016).

Despite its proven benefits, KMC implementation remains inconsistent, particularly in low-resource settings where healthcare infrastructure, workforce training, and institutional policies present significant challenges (Deng et al., 2018; Mhlope et al., 2020). A lack of standardized training programs for nurses, insufficient healthcare resources, and cultural barriers contribute to poor adherence to KMC guidelines. For example, in Namibia, only 39% of healthcare professionals received formal KMC training despite 99%

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acknowledging its benefits (Mhlope et al., 2020). Similarly, in Somalia, 85% of NICU nurses reported inadequate KMC education, resulting in inconsistent application (Hussein et al., 2024). In Kenya, research indicates that policy gaps and insufficient mentorship programs limit nurses' confidence in practicing KMC (Matheka et al., 2023). These findings highlight the urgent need for structured educational interventions and institutional support to enhance KMC knowledge and practice.

In Palestine, the implementation of KMC is further hindered by socio-political instability, fragmented healthcare infrastructure, and the absence of standardized KMC policies (Anonymous, 2024; Cattaneo et al., 2018). The ongoing conflict contributes to limited access to continuous professional development, resource shortages in NICUs, and inconsistent nursing education curricula regarding neonatal care. Furthermore, cultural norms and hierarchical workplace structures often restrict training accessibility, reinforcing knowledge gaps and preventing widespread KMC adoption. While studies in other resource-limited settings have examined KMC knowledge among NICU nurses, no comprehensive assessment has been conducted within the Palestinian healthcare system.

This study addresses this gap by assessing NICU nurses' knowledge of KMC in Palestinian governmental hospitals and identifying predictors of knowledge levels. Understanding these factors is crucial for designing targeted interventions that improve neonatal care in resource-limited environments. By identifying barriers and facilitators of KMC adoption, this study provides critical insights to guide future educational programs, policy development, and institutional strategies aimed at enhancing KMC implementation in Palestine and similar low-resource contexts.

Significance of the Study

KMC is widely recognized for improving neonatal outcomes, particularly in low-resource settings where access to advanced incubator-based care is limited (Boundy et al., 2016; Chan et al., 2016). Despite strong global evidence supporting KMC, knowledge gaps among nurses and systemic implementation challenges persist in many countries, limiting its impact on neonatal survival.

While previous studies have examined the role of nurse education, institutional policies, and training availability in KMC implementation, little is known about these factors in Palestine. The Palestinian healthcare system faces additional challenges, including socio-political instability, fragmented hospital resources, and an absence of standardized KMC guidelines (Ayed et al., 2014; Cattaneo et al., 2018). Furthermore, nurses' access to continuous professional development is often constrained by workload demands, infrastructure limitations, and hierarchical workplace dynamics.

This study is the first to assess KMC knowledge levels among NICU nurses in Palestinian governmental hospitals and examine key predictors of knowledge, including education, work experience, and prior KMC training. By identifying barriers and facilitators to KMC adoption, the findings will inform targeted educational interventions, policy recommendations, and institutional strategies to enhance neonatal care practices in Palestine. The results may also provide insights for other resource-limited settings facing similar challenges in KMC implementation.

Literature Review

Global Impact of Kangaroo Mother Care

KMC is a cost-effective, evidence-based intervention that significantly improves survival rates among preterm and low-birthweight infants (Boundy et al., 2016; Chan et al., 2016). Meta-analyses confirm that KMC reduces neonatal mortality by 36%, enhances breastfeeding rates, and lowers the incidence of hypothermia and nosocomial infections (Boundy et al., 2016). Additionally, studies highlight long-term benefits, including improved neurodevelopmental outcomes and stronger maternal-infant bonding (Chan et al., 2016; El-Sayed et al., 2023).

Challenges in Implementing KMC in Low-Resource Settings

Despite its benefits, KMC implementation remains inconsistent in many low-resource settings due to systemic and cultural barriers (Deng et al., 2018; Mhlope et al., 2020). Studies in Africa and South Asia highlight several key challenges, including training gaps, institutional barriers, and cultural resistance. Many nurses lack structured KMC education, leading to inconsistent practice (Hussein et al., 2024; Mhlope et al., 2020). For example, in Namibia, while 99% of healthcare workers recognized KMC's benefits, only 39% had received formal training (Mhlope et al., 2020). Institutional challenges such as insufficient hospital resources, lack of mentorship programs, and weak policy enforcement further hinder KMC adoption (Matheka et al., 2023; Patel et al., 2024). Additionally, cultural resistance plays a role in some regions where traditional beliefs about infant care discourage skin-to-skin contact, reducing parental adherence to KMC guidelines (Ayed et al., 2014; Badu & Owusu, 2022).

KMC Knowledge and Training Among Nurses

Research consistently shows that nurses' knowledge and training play a crucial role in successful KMC implementation (Fauziyah et al., 2021; Mbele et al., 2022). A study in South Africa found that structured training programs significantly improved nurses' confidence and adherence to KMC protocols (Mbele et al., 2022). Similarly, research in Egypt and Kenya highlights that nurses with prior KMC training demonstrate higher competency and implementation rates (El-Sayed et al., 2023; Matheka et al., 2023).

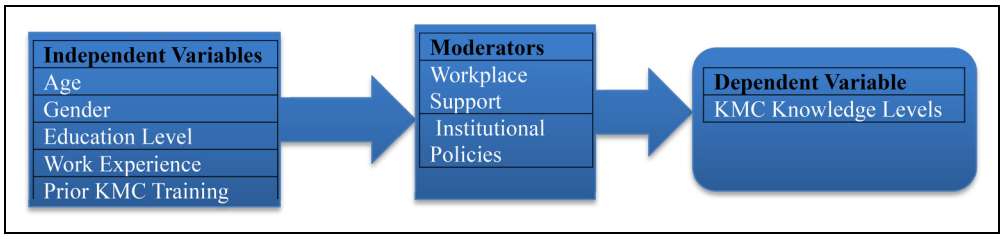

Figure 1. Conceptual Framework Highlighting the Relationships Between Variables Influencing Kangaroo Mother Care (KMC) Knowledge Levels Among NICU Nurses.
Note: Moderators (Workplace Support, Institutional Policies) are included for theoretical context but were not empirically assessed in this study.

KMC Challenges in Palestine

Palestinian NICUs face additional challenges due to political instability, resource shortages, and an absence of standardized KMC policies (Ayed et al., 2014; Cattaneo et al., 2018). Unlike countries where KMC is integrated into nursing education, Palestinian universities allocate limited instructional time (2–4 h) to neonatal care, and there are no mandatory KMC clinical practicums. Furthermore, most in-service training occurs ad hoc (i.e., irregular, non-systematic workshops organized by non-governmental organizations [NGOs] on a short-term or project-specific basis), rather than through institutional mandates (Mbele et al., 2022). These systemic issues contribute to significant knowledge gaps and inconsistencies in KMC practice among NICU nurses in Palestine.

This study aims to bridge this gap by assessing KMC knowledge levels and identifying key predictors of knowledge among Palestinian NICU nurses. The findings will provide a foundation for developing structured training programs, integrating KMC into nursing curricula, and establishing standardized guidelines to enhance neonatal care in Palestine.

Study Framework

This study framework examines the relationship between socio-demographic factors, training exposure, and KMC knowledge among NICU nurses (Figure 1). It is grounded in Bandura's Social Cognitive Theory, which emphasizes the role of learning and environmental influences on behavior (Bandura, 1986). The independent variables include age, categorized as ≤30, 31–40, and 41–60; gender, identified as male or female; education level, which consists of diploma, bachelor's, or master's degrees; work experience, segmented into 10 years; and participation in KMC training, defined as attendance in at least one formal educational session, such as a workshop or in-service training. The dependent variable is the KMC knowledge level, assessed using a validated 20-item questionnaire. Previous studies suggest that higher education and prior KMC training are the strongest predictors of knowledge, while factors such as gender and workplace culture may moderate these relationships (Matheka et al., 2023; Mbele et al., 2022). The framework assumes that both individual characteristics and institutional factors shape nurses' KMC knowledge and practice.

Methodology

Study Design

This cross-sectional analytical study assessed KMC knowledge levels among NICU nurses and identified predictors of knowledge. The STROBE checklist was followed to ensure transparency and completeness in reporting. The moderators in the conceptual framework (Workplace Support and Institutional Policies) were included for theoretical context but were not empirically measured in this study.

Research Questions: What is the level of KMC knowledge among Palestinian NICU nurses?

Study Setting

The study was conducted in 14 governmental NICUs across the West Bank, Palestine. These units were selected because they provide essential neonatal care for preterm and low birth weight infants in a resource-limited setting. The NICUs had a combined capacity of 180 incubators, with staffing primarily composed of registered nurses providing direct neonatal care.

Sample Size and Sampling Technique

The target population for this study initially included 320 NICU nurses across 14 governmental hospitals. However, during the data collection period (January–May 2024), the total number of eligible nurses increased to 350 due to new hires and updated staffing records. Using Raosoft software (Raosoft Inc., 2004), the recalculated minimum sample size for a population of 350, at a 95% confidence level and 5% margin of error, was 187 participants. To account for potential non-responses, 220 nurses were invited, resulting in a final sample of 190 respondents (response rate: 86.4%). This adjustment ensured adequate representation of the expanded workforce while maintaining statistical precision.

Inclusion and Exclusion Criteria

Inclusion Criteria:

- Full-time NICU nurses with ≥1 year of experience
- Proficiency in reading and writing in English
- Willingness to provide informed consent

Exclusion Criteria:

- Head nurses, nursing managers, and administrative staff (to focus on direct caregivers)
- Nurses unavailable during data collection

Variable Operationalization

Independent variables were defined and measured as follows: Age, categorized into ≤30, 31–40, and 41–60 years (self-reported); Gender, self-identified as male or female; Education Level, classified as diploma, bachelor's, or master's degree; Work Experience, stratified as <5, 5–10, or >10 years in NICUs; and Prior KMC Training, defined as attendance in ≥1 formal workshop or in-service session. The dependent variable was KMC Knowledge, assessed through a validated 20-item multiple-choice questionnaire (Supplementary File 1), covering domains such as thermal regulation and maternal-infant bonding. Moderators were defined within a theoretical context, including Workplace Support, conceptualized as resource availability (e.g., recliners) and managerial encouragement, and Institutional Policies, conceptualized as written KMC protocols or mentorship programs. These moderators were not empirically measured but acknowledged as contextual influences.

Instrument Development

A structured 20-item multiple-choice questionnaire was developed to assess nurses' knowledge of KMC. The development process followed three stages.

First, in the literature review stage, questions were derived from peer-reviewed studies on KMC knowledge, focusing on topics such as thermal regulation, breastfeeding, maternal-infant bonding, and early discharge. Second, the expert validation stage involved a review by five neonatal care experts, including three senior NICU nurses, one pediatrician specializing in neonatology, and one nursing education faculty member. All experts had at least 10 years of experience and evaluated the content relevance, clarity, and comprehensiveness of the questionnaire. The Content Validity Index (CVI) was calculated at 0.92, indicating strong validity. Third, pilot testing was conducted with 30 NICU nurses who were excluded from the main study. The questionnaire achieved a Cronbach's alpha of 0.84, confirming high internal consistency for knowledge assessment tools (Polit & Beck, 2021). Each multiple-choice question included four answer choices, with one correct answer and three distractors. For example: "Which component is NOT part of KMC?" with options a) Skin-to-skin contact, b) Exclusive breastfeeding, c) Early discharge, and d) Supplemental formula feeding. The full questionnaire is available in Supplementary File 1.

Knowledge levels were categorized using Bloom's taxonomy, a widely used framework in educational assessment (Bloom, 1956). Although originally developed for general education, Bloom's principles have been adapted for healthcare research to classify competency levels (El-Sayed et al., 2023; Krathwohl, 2002). Studies on neonatal care knowledge employ similar thresholds: less than 60% indicates low knowledge (basic recall), 60–79% denotes moderate knowledge (application and comprehension), and 80% or higher signifies high knowledge (critical thinking and synthesis). This approach aligns with standardized educational benchmarks and facilitates comparability across studies (Fauziyah et al., 2021; Patel et al., 2024).

Data Collection Procedure

Data Collection Procedure Ethical approval was obtained from Arab American University, Palestine (R-2024/A/173/N) before study initiation. Researchers visited each NICU, explained the study's purpose, and obtained written informed consent from all participants. Face-to-face administration ensured clarity and response completeness. To reduce social desirability bias, nurses were assured of anonymity and confidentiality. Data collection occurred from January to May 2024.

Confounding Variables and Bias Control

Potential biases were minimized through several strategies. First, non-clinical staff were excluded to focus on direct caregivers. Second, standardized face-to-face data collection was employed to ensure consistency in the process. Lastly, multiple linear regression analysis was utilized to statistically control demographic influences such as age, education, and training.

Data Analysis

Statistical analysis was performed using SPSS version 26 (IBM Corp., 2019), with descriptive statistics summarizing demographic characteristics and knowledge scores. Independent t-tests and ANOVA compared knowledge across subgroups, while Pearson's correlation analysis explored relationships between continuous variables. Multiple linear regression identified predictors of KMC knowledge, focusing on independent variables since moderators were not empirically tested. The significance threshold was set at $p < 0.05$.

Missing Data Management

No missing data were reported; all questionnaires were fully completed. Had missing data occurred, listwise deletion would have been used to maintain statistical integrity.

Table 1. Demographic Characteristics of Participants (n = 190).

Characteristic	n	%
Age		
30 years or less	104	54.7%
31–40 years	74	38.9%
41–60 years	12	6.3%
Gender		
Male	27	14.2%
Female	163	85.8%
Educational Level		
Diploma	15	7.9%
Bachelor	148	77.9%
Master and above	27	14.2%
Work Experience in NICU		
Less than 5 years	52	27.4%
5–10 years	73	38.4%
More than 10 years	65	34.2%
Receiving Educational Sessions on KMC		
Yes	84	44.2%
No	106	55.8%

All participants provided complete demographic and knowledge data; no missing values were recorded.

Table 2. Knowledge Levels of Nurses on KMC (n = 190).

Knowledge Level	n	%
Low knowledge level	79	41.6%
Moderate knowledge level	65	34.2%
High knowledge level	46	24.2%

Results

Of the 220 invited to participate in the study, 190 NICU nurses completed the questionnaire, resulting in a response rate of 86.4%. The demographic characteristics are illustrated in Table 1. The mean age for participants was 32.1 years (SD = 6.5), with ages ranging from 23 to 60 years. Most of the respondents were female (85.8%, n = 163), and the majority had attained a bachelor's degree (77.9%, n = 148), while 7.9% (n = 15) had a diploma and 14.2% (n = 27) had a master's degree. The mean years of NICU work experience were 7.2 years (SD = 4.4), with 27.4% (n = 52) of the nurses having less than 5 years of experience, 38.4% (n = 73) having 5–10 years, and 34.2% (n = 65) having over 10 years of experience. Additionally, 44.2% (n = 84) of nurses reported previous exposure to KMC educational sessions, while 55.8% (n = 106) had never received formal KMC training. This represents a higher proportion of untrained nurses than expected, reinforcing the need for targeted educational interventions.

The analysis of KMC knowledge among the nurses showed that the mean knowledge score was 58.2%, SD = 18.9, and the distribution revealed that 41.6% (n = 79) of participants had low knowledge, 34.2% (n = 65) had moderate knowledge, and 24.2% (n = 46) had high knowledge. The total knowledge score for each participant was calculated based on the sum of the number of correct answers. Finally, the scores were categorized as low, moderate, and high knowledge levels according to Bloom's cutoff. The slight increase in mean knowledge scores compared to previous findings may reflect growing awareness of KMC practices, although knowledge gaps remain prominent (Table 2).

Table 3. Predictors of Nurses' Knowledge of KMC: Multiple Linear Regression.

Predictor	B	Beta	t	*p*-value	95% Confidence Interval
Age	10.021	0.389	6.513	<0.001	7.002–13.041
Gender	−5.127	−0.112	−3.402	0.001	−8.293 – −1.961
Educational level	6.798	0.190	5.432	<0.001	4.276–9.319
Work experience	−0.712	−0.036	−0.997	0.319	−2.601–1.177
Receiving educational sessions on KMC	17.412	0.529	9.012	<0.001	13.389–21.435

Predictors of Knowledge on KMC

A multiple linear regression analysis was conducted to identify the predictors of knowledge about KMC. The overall model was statistically significant ($p < 0.001$), with an R^2 value of 0.829, indicating that 82.9% of the variance in nurses' knowledge was explained by the independent variables. The strongest positive predictor of KMC knowledge was receiving educational sessions on KMC (B = 17.412, $p < 0.001$), indicating that nurses who had received prior KMC training scored significantly higher. Age (B = 10.021, $p < 0.001$) was another significant positive predictor, showing that older nurses demonstrated greater knowledge. Educational level (B = 6.798, $p < 0.001$) also had a positive impact, with nurses holding higher degrees scoring better. Gender was a statistically significant negative predictor (B = −5.127, $p = 0.001$), with male nurses demonstrating lower scores. Unlike previous assumptions, work experience remained an insignificant predictor (B = −0.712, $p = 0.319$), suggesting that years in NICU practice alone do not necessarily improve KMC knowledge without structured training (Table 3).

These findings reinforce the critical role of structured KMC training in improving nurses' knowledge, as informal experience alone does not significantly contribute to higher knowledge levels.

Discussion

This study found that Palestinian NICU nurses have suboptimal knowledge of KMC, with 44.4% scoring below the competency threshold (<60%). While prior research highlights KMC's effectiveness in reducing neonatal mortality

(Boundy et al., 2016; Chan et al., 2016), knowledge deficits among nurses remain a major barrier to implementation, particularly in low-resource settings.

Factors Influencing KMC Knowledge

Training and education revealed that prior KMC training was the strongest predictor of knowledge ($B = 16.656$, $p < 0.001$), aligning with studies in Egypt and South Africa, where nurses who received structured training demonstrated significantly better competency (El-Sayed et al., 2023; Mbele et al., 2022). Additionally, nurses with higher education levels scored significantly higher ($B = 6.365$, $p < 0.001$), reinforcing findings from Kenya and India that link advanced nursing degrees to improved neonatal care knowledge (Matheka et al., 2023; Thakur, 2023).

In terms of age and experience, older nurses performed better than younger nurses ($B = 9.934$, $p < 0.001$), possibly due to longer exposure to neonatal care practices. However, work experience alone was not a significant predictor ($B = -0.712$, $p = 0.319$). This finding contrasts with results from Kenya, where experience was a strong predictor of knowledge (Matheka et al., 2023). The lack of structured KMC training in Palestinian NICUs may explain this discrepancy.

Regarding gender disparities, male nurses scored lower than female nurses ($B = -4.852$, $p = 0.002$), consistent with research in Somalia, where male nurses demonstrated lower engagement in neonatal care training (Hussein et al., 2024). Cultural norms may influence male nurses' participation in neonatal caregiving, warranting targeted interventions to encourage gender-inclusive neonatal training programs.

Systemic Barriers to KMC Implementation in Palestine

While KMC training improves knowledge, systemic issues hinder its adoption in Palestinian NICUs. First, the absence of standardized KMC policies is evident; unlike countries with national KMC frameworks, such as South Africa, Palestine lacks formal guidelines for neonatal care (Mbele et al., 2022). Second, there are limited professional development opportunities, as only 44.2% of nurses have received formal KMC training, often through ad hoc NGO-led workshops rather than structured hospital programs. Finally, cultural and institutional barriers exist, as hierarchical workplace structures may limit access to training for younger nurses and male staff.

Strengths and Limitations

Strengths

This study offers several notable strengths. First, it is the first comprehensive assessment of KMC knowledge among NICU nurses in Palestinian governmental hospitals, addressing a critical gap in low-resource neonatal care literature. The use of a validated questionnaire ($CVI = 0.92$; $\alpha = 0.84$) ensures robust measurement of knowledge, while the inclusion of a large, representative sample ($n = 190$) enhances statistical power and generalizability within the study context. The multi-hospital design, spanning 14 NICUs across the West Bank, further strengthens external validity. Additionally, the application of multiple linear regression identified key predictors of knowledge, such as prior training and education, providing actionable insights for policymakers. Finally, adherence to STROBE guidelines and transparent reporting of methods bolster methodological rigor.

Limitations

Several limitations should be acknowledged. The cross-sectional design precludes causal inferences, and self-reported data may introduce social desirability bias. While the study framework acknowledged moderators such as workplace support and institutional policies, these factors were not empirically measured, limiting the exploration of systemic barriers. The sample was restricted to governmental hospitals, excluding private-sector nurses who may face distinct challenges. Furthermore, the categorization of knowledge using Bloom's taxonomy, though standardized, may not fully capture clinical competency or practical application. Lastly, the gender disparity in the sample (85.8% female) reflects broader workforce demographics but limits the generalizability of findings to male nurses.

Future Research Directions

While this study focused on knowledge assessment, the success of KMC implementation also depends on nurses' beliefs and clinical performance. Future studies should assess cultural attitudes toward KMC, as understanding how social norms influence practice is essential for designing effective interventions. Additionally, evaluating the clinical application of KMC techniques through observational studies could measure the impact of knowledge on actual bedside implementation. Conducting longitudinal research is also important; tracking knowledge retention after structured training programs could inform best practices for continued education. By addressing these gaps, healthcare policymakers, educators, and hospital administrators can enhance KMC training, promote evidence-based neonatal care, and ultimately improve infant survival rates in Palestine and similar low-resource settings.

Practical Implications

To improve KMC implementation, multilevel interventions are necessary. First, the integration of KMC into nursing curricula is essential, as Palestinian universities currently allocate only 2–4 lecture hours to neonatal care, with no mandatory KMC clinical practicum. Expanding this curriculum could standardize neonatal education. Second, mandatory in-service

training should be established; structured hospital-based KMC training programs could ensure ongoing professional development. Third, institutional support for KMC adoption is crucial; hospitals must provide essential resources, such as recliners and privacy screens, and ensure policy enforcement. Finally, targeted gender-inclusive training is needed, as gender disparities in knowledge exist. Inclusive mentorship programs could support male nurses in neonatal care roles.

Conclusion

This study found that Palestinian NICU nurses have suboptimal knowledge of KMC, with 44.4% scoring below the competency threshold of 60%. Key predictors of knowledge included prior KMC training, age, and education level, while work experience was not a significant factor. Male nurses scored lower than female nurses, highlighting a gender disparity in neonatal care knowledge. These findings indicate an urgent need for several interventions. First, the integration of KMC training into nursing curricula is crucial, as Palestinian nursing programs currently allocate only 2–4 h to neonatal care without mandatory clinical practicums. Expanding this curriculum could standardize neonatal education. Second, structured in-service training is necessary since only 44.2% of nurses have received formal KMC education, primarily through ad hoc NGO-led workshops. Establishing mandatory hospital-based KMC training programs would ensure ongoing professional development. Third, institutional support and policy development are needed; the absence of standardized KMC policies in Palestine limits implementation. Developing hospital guidelines and national protocols could enhance KMC adoption and sustainability. Finally, gender-inclusive training programs should be implemented. Given the gender disparities in KMC knowledge, targeted mentorship and education initiatives could increase male nurses' engagement in neonatal care.

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Statements and Declarations

Ethical Considerations

Ethical approval for this study was obtained from Arab American University, Palestine (R-2024/A/173/N).

Consent to Participate

Written informed consent was obtained from all subjects before the study.

Consent for Publication

We affirm that this work is original and has not been published elsewhere, except as noted in the manuscript.

Author Contributions/CRediT

A.A. initiated the study, developed the research design, and supervised the overall implementation of the project. I.A. provided critical input on the study design, guided the data analysis process, and contributed to the manuscript drafting and revisions. R.A., R.A.T., D.Z., and M.A.A. participated in data collection and assisted in preparing the initial draft of the manuscript. All authors reviewed and approved the final version of the manuscript for submission. They agree to be accountable for all aspects of the work, ensuring that any questions related to accuracy or integrity are appropriately addressed and resolved.

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Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Supplemental Material

Supplemental material for this article is available online.

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