

# Effectiveness of an Educational Program on Nurses' Competence Regarding Palliative Care of Children with Cancer in Mosul City

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## ABSTRACT

**Introduction:** Pediatric palliative care is essential for improving the quality of life of children with cancer and their families. Nurses play a critical role in delivering this care; however, many lack adequate training and competence in pediatric palliative care practices. **Objectives:** This study aimed to evaluate the effectiveness of an educational program on nurses' competence in providing pediatric palliative care for children with cancer. **Methods:** A quasi-experimental, single-group design was conducted at Al-Hadbaa Specialized Hospital, Mosul, from September 15, 2024, to March 17, 2025. A purposive sample of 25 nurses participated. Data were collected using a structured tool covering socio-demographic characteristics, four domains of knowledge, and four domains of skills related to pediatric palliative care. Competence levels were assessed pre-program, immediately post-program (post-test I), and at follow-up (post-test II). **Results:** Prior to the intervention, 76% of nurses were classified as Needs Improvement, and 20% were classified as Very Low in overall knowledge. Following the educational program, knowledge levels improved substantially: in post-test I, 52% of nurses achieved good, and 44% achieved Excellent classifications. Further improvement was observed at post-test II, where 60% were classified as Excellent and 36% as Good. Similarly, baseline skill levels indicated that 76% of nurses were classified as Needs Improvement before the intervention. After program implementation, post-test I results showed 48% achieving Excellent and 44% achieving Good levels. At post-test II, 64% of nurses reached Excellent, and 20% were classified as Good, demonstrating sustained improvement. Statistical analysis revealed highly significant differences between pre-intervention and post-intervention phases ( $p < 0.001$ ), with large effect sizes observed for both knowledge and skills. No statistically significant differences were found between post-test I and post-test II ( $p > 0.05$ ), indicating retention of competence gains over time. **Conclusion:** The structured educational program significantly enhanced nurses' knowledge and skills in pediatric palliative care, bridging initial competence gaps. These findings support the integration of similar training into in-service education and nursing curricula to strengthen pediatric oncology care in resource-limited setting

**Keywords:** Children; Competence; Effectiveness; Educational Program; Palliative Care

## INTRODUCTION

Cancer is an abnormal proliferation of cells that multiply despite spatial constraints. These malignant cells can spread to other parts of the body, often differing in structure from healthy cells and functioning abnormally (Forghani *et al.*, 2026). Globally, the World Health Organization (WHO, 2022) estimates that 400,000 children are diagnosed with cancer each year, with nearly 80% of these cases occurring in Low- and Middle-Income Countries (LMICs). Every one of these children requires palliative care, underscoring the importance of integrating pediatric palliative care into standard pediatric oncology services (Ajambo *et al.*, 2026). Survival disparities remain stark: cure rates exceed 80% in high-income countries, but in many LMICs they range only between 15% and 45%, accounting for more than 90% of annual childhood cancer deaths (Linder, 2021).

In Iraq, the national cancer registry reported 1,818 pediatric cancer cases in 2022 among children aged 0–14 years, with an incidence rate of 10.6 per 100,000. In Nineveh, the rate was 9.1 per 100,000. Despite the growing burden, healthcare professionals in Iraq face significant challenges in managing symptoms associated with progressive, life-threatening conditions (Salim *et al.*, 2026).

The WHO defines Pediatric Palliative Care (PPC) as comprehensive care that addresses the physical,

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psychosocial, and spiritual needs of the child, while also providing support to the family (Santini *et al.*, 2026). The high rates of childhood cancer and the resulting deaths in the Middle East are key factors driving the demand for palliative care in these countries (Mojen *et al.*, 2017). Unlike hospice care, which focuses on end-of-life support, PPC begins at diagnosis and continues throughout the illness trajectory (Trae *et al.*, 2026). The demand for palliative care for patients nearing the end of life and their caregivers is increasing. Education on Palliative and End-of-Life Care (EoLC) is recommended for all healthcare professionals (such as physicians, nurses, and allied health practitioners) and social care workers (like social workers) to ensure quality service. However, less emphasis has been placed on generic EoLC education compared to specialized training. This study assessed the effectiveness of short-term, generic EoLC educational programs for health and social care professionals (Wong *et al.*, 2022). Nurses play a crucial role in delivering end-of-life care to individuals in the final stages of life, and their self-efficacy is a critical factor influencing the quality of this care. This study aimed to assess the impact of palliative care on nurses' perceived self-efficacy (Dehghani *et al.*, 2020). Globally, around 21.6 million children require palliative care, with 8.2 million in need of specialized services. After Africa and Southeast Asia, the Middle East ranks third in terms of unmet pediatric palliative care needs (Clelland *et al.*, 2020; Al-Waly *et al.*, 2020).

Nurses play a pivotal role in PPC, particularly in oncology settings. They are responsible for symptom management, communication, family support, and coordination of care, all of which improve quality of life for both children and their families (Agrawal *et al.*, 2024). Competence in PPC requires nurses to integrate knowledge, skills, and attitudes that are essential for high-quality care (Jia *et al.*, 2024). Globally, specialized educational programs have been developed to enhance nurses' knowledge and competence in PPC, especially at postgraduate levels (Goossens *et al.*, 2025). Some Middle Eastern countries, such as Jordan and Saudi Arabia, have begun advancing PPC as a subspecialty (Lind *et al.*, 2026). However, in Iraq, awareness and understanding of palliative care remain very limited. Most healthcare providers are unfamiliar with its principles due to the absence of a national program and the lack of structured educational opportunities (Fadhil & Ghali, 2019). Despite the high and rising burden of pediatric cancer in Iraq, there is a significant shortage of trained, competent PPC nurses. To date, little empirical research has evaluated targeted educational programs aimed at improving nurses' knowledge and skills in this area. This study addresses that gap by assessing the effectiveness of a structured educational program for oncology nurses in Mosul City.

### **Objectives of the Study:**

1. To assess baseline knowledge and skills of nurses regarding pediatric palliative care.
2. To evaluate the effect of the structured educational program on nurses' knowledge and skills.
3. To determine whether improvements were retained at follow-up.
4. To explore correlations between nurses' demographic variables and competence outcomes.

## **METHODOLOGY**

### **Research Design and Setting**

A quasi-experimental design with a single-group pre-test, post-test I, and post-test II was employed to evaluate the effectiveness of the educational program on nurses' competence in pediatric palliative care. The study was conducted at Al-Hadbaa Specialized Hospital, Mosul, from September 15, 2024, to March 17, 2025.

### **Sample**

A purposive sample of 25 nurses working in oncology wards was selected. Nurses not working in oncology were excluded. The sample size was constrained by the limited nursing workforce and heavy patient load in the unit (Ibrahim & Ibrahim, 2025).

### **Educational Program**

The program consisted of five structured lectures, delivered over three weeks. Two sessions were held each week, and each lecture lasted one hour. The sessions covered core concepts of pediatric palliative care, symptom management, communication, grief and bereavement, and nurse self-care.

## Data Collection Tools

The study instrument comprised three parts:

1. **Socio-Demographic Characteristics** (age, sex, education, years of experience, oncology ward experience, and prior training).
2. **Knowledge Assessment:** 20 multiple-choice questions divided into four domains (basic concepts, symptom management, grief/bereavement, and self-care).
3. **Skills Assessment:** 20 multiple-choice questions divided into four domains (pain management, symptom management, communication, and psychosocial support).

Scoring was based on Miller's pyramid model of competence (Abdullah *et al.*, 2024). Responses were rated on a five-point scale: Very low (0–1), Needs improvement (2), Acceptable (3), Good (4), and Excellent (5). Total scores were categorized as Very low (0–4), Needs improvement (5–8), Acceptable (9–12), Good (13–16), and Excellent (17–20).

## Validity and Reliability

Content validity was established through review by a panel of 23 experts from nursing and medical specialties. Reliability was confirmed in a pilot study involving 10 nurses (excluded from the main sample). Test–retest reliability yielded coefficients of 0.805 for knowledge and 0.861 for skills. Administrative permission was obtained from hospital nursing leadership. Written informed consent was secured from all participants. Data was anonymized, stored securely, and reported in aggregate, with no patient identifiers recorded.

## Data Analysis

Data was analyzed using SPSS version 27. Descriptive statistics summarized demographic data, while inferential tests (Wilcoxon matched pairs, Friedman test, and Kendall's tau correlation) were applied to assess program effects. Normality testing indicated non-normal data distribution; therefore, non-parametric tests were applied.

## Ethical Considerations

The researchers, obtained ethical clearance from the University of Mosul Collegiate Committee for Medical Research Ethics Iraq, with approval number. 35, CCMRE-Nur-24-6, on 28<sup>th</sup> October 2024.

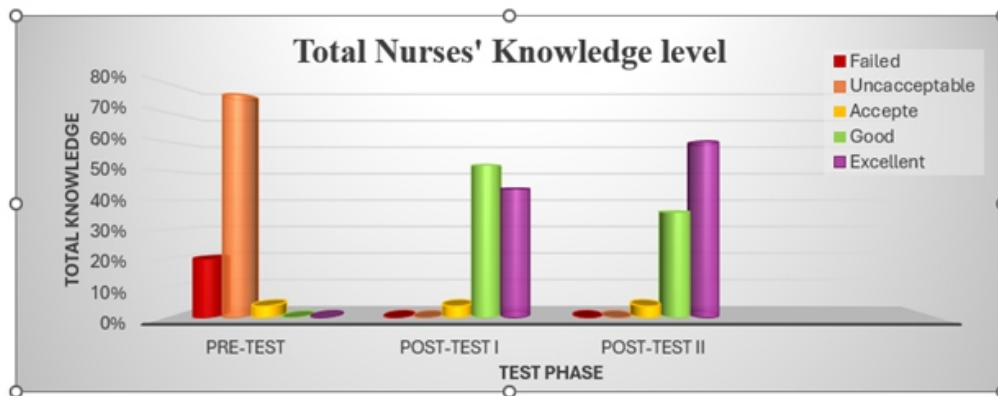
## RESULTS

### Socio-Demographic Characteristics of Nurses

*Table 1: Socio-demographic Characteristics of the Study Nurses (n = 25)*

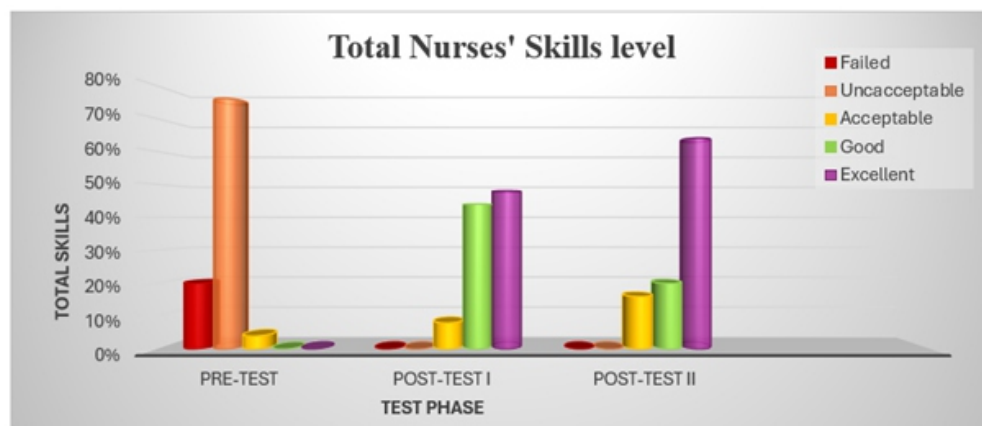
Variable	Category	Number	Percentage (%)
Age	20–29 years	15	60
	30–39 years	8	32
	40–49 years	2	8
Sex	Male	10	40
	Female	15	60
Education level	Secondary degree	3	12
	Institute degree	9	36
	Bachelor degree	13	52
General experience	1–5 years	17	68
	6–10 years	4	16
	11–15 years	1	4
	16–20 years	2	8
	>20 years	1	4
Oncology experience	1–4 years	21	84
	9–12 years	2	8
	13–16 years	2	8

Table 1 presents the socio-demographic characteristics of the participating nurses. The majority of nurses were young adults aged 20–29 years, accounting for nearly two-thirds of the sample, while a smaller proportion were aged 30–39 years, and only a few were above 40 years. Female nurses constituted a higher percentage than males. More than half of the people who took part had a bachelor's degree, while the rest of the nurses had either an institute or secondary nursing qualification. Regarding professional experience, most nurses had fewer than five years of general nursing experience and limited oncology ward experience. Notably, none of the participants had previously received formal training in pediatric palliative care, highlighting a substantial educational gap prior to the intervention.



**Figure 1: Distribution Frequency of the Total Nurses' Knowledge Level of Palliative Care of Children in Pre-, Post I, and post II.**

Figure 1 illustrates the distribution of nurses' total knowledge levels across the pre-test, post-test I, and post-test II phases. At the beginning, most nurses were put into the "very low" or "needs improvement" groups. Following the educational program, there was a marked shift toward higher knowledge levels, with the majority of nurses achieving good or excellent competence in post-test I. These gains were further sustained and slightly enhanced at post-test II, demonstrating a lasting improvement in knowledge over time.



**Figure 2: Distribution Frequency of the Total Nurses' Skills Level of Palliative Care of Children in Pre-, Post I, and Post II**

Figure 2 depicts changes in nurses' total skill levels related to pediatric palliative care across the three assessment phases. Before the intervention, skill levels were predominantly low. After completion of the educational program, a substantial increase in good and excellent skill levels was observed. By the follow-up assessment, most nurses demonstrated excellent skill competence, indicating the effectiveness of the program in improving and sustaining practical performance.

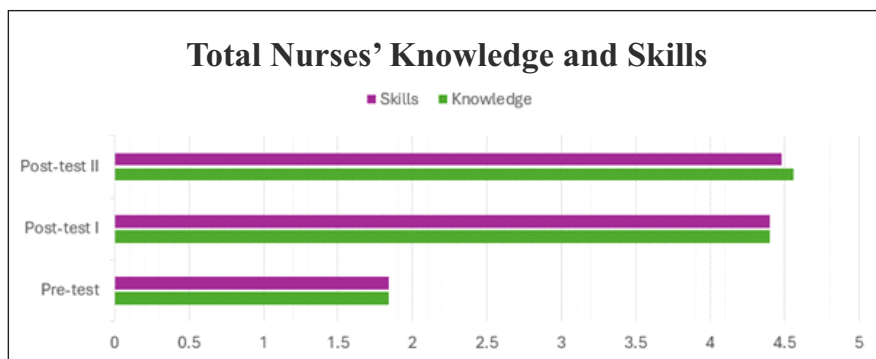


Figure 3: Mean Distribution of Total Nurses' Knowledge and Skills Regarding Palliative Care

Figure 3 presents the mean scores of nurses' total knowledge and skills across the study phases. Both outcomes show a clear upward trend from the pre-test to post-test I, followed by stabilization at post-test II. The parallel improvement patterns indicate that gains in knowledge were accompanied by corresponding improvements in skills, reinforcing the overall effectiveness of the educational intervention.

Table 2: Distribution of Nurses' Knowledge on Pediatric Palliative Care across Three Phases (n = 25)

Domain	Estimate	Pre-test n (%)	Post-test I n (%)	Post-test II n (%)	$\chi^2$	p-value
Basic concepts and principles	Excellent	0 (0)	12 (48)	13 (52)	36.87	0.000
Managing physical symptoms	Excellent	0 (0)	3 (12)	8 (32)	44.49	0.000
Grief and bereavement	Excellent	0 (0)	11 (44)	14 (56)	39.32	0.000
Nurse self-care	Excellent	0 (0)	7 (28)	12 (48)	39.49	0.000
<b>Total knowledge</b>	Excellent	0 (0)	11 (44)	15 (60)	44.49	0.000

As shown in Table 2, nurses' knowledge regarding pediatric palliative care demonstrated significant improvement across all assessed domains following the educational program. At baseline, none of the nurses achieved an excellent level of knowledge in any domain. However, after the intervention, a substantial shift toward higher competence levels was observed. Knowledge of basic concepts and principles showed the most pronounced improvement, with more than half of the nurses reaching an excellent level by post-test II. Similar patterns were evident in the domains of symptom management, grief and bereavement, and nurse self-care. Overall knowledge scores improved significantly across the three phases, with statistical analysis confirming highly significant differences ( $p < 0.001$ ), indicating the effectiveness of the educational program in enhancing nurses' knowledge.

Table 3: Distribution of Nurses' Skills on Pediatric Palliative Care across Three Phases (n = 25)

Domain	Estimate	Pre-test n (%)	Post-test I n (%)	Post-test II n (%)	$\chi^2$	p-value
Pain management	Excellent	0 (0)	13 (52)	16 (64)	39.19	0.000
Managing symptoms	Excellent	0 (0)	5 (20)	8 (32)	42.49	0.000
Communication with child	Excellent	0 (0)	11 (44)	12 (48)	35.63	0.000
Psychosocial support	Excellent	0 (0)	9 (36)	14 (56)	39.94	0.000
<b>Total skills</b>	Excellent	0 (0)	12 (48)	16 (64)	43.81	0.000

Table 3 illustrates changes in nurses' skills related to pediatric palliative care across the pre-test, post-test I, and post-test II phases. Prior to the intervention, none of the nurses demonstrated excellent skill levels in any domain. Following the educational program, marked improvements were observed in all skill areas. Pain management skills showed the greatest improvement, with nearly two-thirds of nurses achieving excellent competence at follow-up. Improvements were also evident in symptom management, communication with children, and psychosocial support. These findings indicate a consistent and statistically significant improvement in practical skills following the intervention ( $p < 0.001$ ).

**Table 4: Comparison of Nurses' Total Knowledge and Skills across Phases**

Variable	Comparison	Z	p-value	Sig.	Effect size
Knowledge	Pre vs Post I	-4.481	0.000	HS	0.890 (large)
	Pre vs Post II	-4.532	0.000	HS	—
	Post I vs Post II	-1.265	0.206	NS	—
Skills	Pre vs Post I	-4.455	0.000	HS	0.876 (large)
	Pre vs Post II	-4.431	0.000	HS	—
	Post I vs Post II	-0.535	0.593	NS	—

Note. HS = highly significant; NS = not significant

Table 4 compares nurses' total knowledge and skills scores across the three assessment phases. The results demonstrate highly significant improvements in both knowledge and skills when comparing pre-test scores with post-test I and post-test II scores ( $p < 0.001$ ). Large effect sizes were observed for both outcomes, indicating a strong impact of the educational program. In contrast, no statistically significant differences were found between post-test I and post-test II, suggesting that the improvements achieved immediately after the intervention were maintained over time.

**Table 5: Correlation between Nurses' Demographic Variables and Program Outcomes**

Variable	Phase	Knowledge $r$ ( $p$ )	Skills $r$ ( $p$ )
Sex	Pre	0.090 (0.655)	-0.090 (0.655)
Age	Pre	-0.256 (0.189)	0.128 (0.511)
Education	Pre	0.183 (0.343)	-0.041 (0.833)
Experience	Pre	0.029 (0.878)	0.234 (0.220)
Duration	Pre	-0.059 (0.766)	0.156 (0.427)

Note: No Significant Correlations ( $p > 0.05$ )

As presented in Table 5, no statistically significant correlations were found between nurses' demographic characteristics and their knowledge or skills scores. Variables such as age, sex, educational level, years of experience, and duration of oncology ward experience were not significantly associated with competence outcomes ( $p > 0.05$ ). These findings suggest that the educational program was equally effective across different demographic subgroups.

## DISCUSSION

The nursing profession in Iraq faces significant challenges that directly affect the delivery of healthcare services, including specialized areas such as pediatric palliative care. Despite progress in rebuilding the health sector after years of conflict and instability, nursing remains underdeveloped compared to global standards. The overall nurse-to-population ratio in Iraq is substantially lower than that recommended by the World Health Organization, leading to staff shortages and heavy workloads in hospitals and primary healthcare centers (Fadhil & Ghali, 2019).

Educationally, nursing programs in Iraq have expanded in recent years, with multiple universities offering bachelor's and postgraduate degrees. However, curricula often emphasize general nursing competencies while lacking specialized training in emerging fields such as oncology and palliative care. Continuing education opportunities are limited, and structured in-service training programs are rarely sustained. Consequently, many nurses enter clinical practice without adequate preparation to manage complex, life-limiting conditions, such as pediatric cancer.

Culturally, the nursing profession in Iraq is sometimes undervalued, with societal perceptions still favoring physicians as the primary caregivers. This aspect has implications for recruitment and retention,

particularly among female nurses, who make up the majority of the workforce but may face social barriers to long-term career advancement (Alt *et al.*, 2025). Moreover, nurses are often excluded from policymaking and health planning, which restricts their ability to advocate for the development of essential services such as palliative care.

In the context of pediatric oncology, these systemic challenges translate into gaps in symptom management, psychosocial support, and communication with patients and families. The absence of a national palliative care strategy in Iraq further limits the availability of structured services, placing additional responsibility on individual hospitals and healthcare professionals to address patients' needs. Given these constraints, strengthening nursing education and capacity-building is critical to improving the quality of pediatric cancer care and aligning Iraq's health system with global standards of comprehensive cancer management.

The present study demonstrated significant improvements in nurses' knowledge and skills in pediatric palliative care following the implementation of an educational program. Before the intervention, most participants had very low ability to achieve the required level of competence, particularly in domains such as symptom management, grief and bereavement, and psychosocial support. After the program, however, there was a marked shift toward good and excellent levels, with improvements sustained at follow-up testing. These findings highlight the effectiveness of structured, targeted training in bridging competence gaps among oncology nurses.

Improvements in knowledge of basic palliative care concepts and symptom management are consistent with studies from Egypt and Turkey, which also reported highly significant increases after training interventions (Abd-Elrahman Radwan *et al.*, 2022; Kudubes & Bektas, 2020). Similarly, the enhancement of skills in pain management and communication aligns with results from Hong Kong, where continuing education programs led to lasting improvements in nurses' perceived competence (Hayes *et al.*, 2026). The similarity across different settings suggests that structured educational interventions, regardless of delivery method, are effective in equipping nurses with essential palliative care competencies.

At the same time, certain contextual differences should be acknowledged. For instance, while studies from Jordan and Saudi Arabia benefited from established palliative care frameworks (Demilie *et al.*, 2025), Iraqi nurses had no prior exposure to formal training in this field. This fact is likely to explain the greater baseline deficits observed in the present study. Nevertheless, the improvements achieved are encouraging, suggesting that even in resource-limited contexts without national palliative care programs, well-designed educational initiatives can yield significant gains (Alkhyatt *et al.*, 2012; Hasan *et al.*, 2021).

The findings also revealed no significant correlation between nurses' demographic characteristics and program outcomes. This result is consistent with studies in Egypt and China (Jia *et al.*, 2024), which found that factors such as age, sex, or years of experience did not significantly affect knowledge or skills acquisition. This suggests that the benefits of palliative care training are broadly applicable across nursing subgroups, emphasizing the importance of making such programs widely available. These findings resonate with results from other LMICs such as Uganda and Nepal, where structured educational interventions also yielded significant improvements in palliative care competence among nurses despite resource limitations (Ajambo *et al.*, 2026; Thapa *et al.*, 2022). This broader alignment highlights the global relevance of integrating structured PPC education into health systems facing similar challenges.

For Iraq, these findings carry important implications. Nursing curricula currently lack formal palliative care components, and hospital-based in-service programs are rare. Integrating structured PPC education into undergraduate curricula would prepare future nurses with essential competencies. At the hospital level,

regular workshops and continuing education sessions could ensure that practicing nurses maintain and update their skills. Additionally, developing standardized Arabic-language training manuals tailored to local cultural contexts could support consistency in practice across different healthcare facilities (Agha & Al Mukhtar, 2025).

This study confirms that structured educational programs are effective in enhancing nurses' competence in pediatric palliative care, even in contexts where palliative care is underdeveloped. By addressing training gaps at both the academic and clinical levels, Iraq can make substantial progress in improving the quality of care for children with cancer and their families.

### **Limitations**

The study was limited by its small sample size ( $n = 25$ ) and its single-site setting at Al-Hadbaa Specialized Hospital. These factors limit the generalizability of the findings to broader nursing populations in Iraq or other contexts. Future multi-center studies with larger samples are recommended to enhance external validity.

### **CONCLUSION**

This study demonstrated that a structured educational program significantly improved nurses' knowledge and skills in pediatric palliative care. Participants, who initially showed low competence, achieved substantial and sustained improvements across all domains. These results show that personalized training works to improve nurses' skills in pediatric oncology settings. The findings also indicate how such programs could influence national healthcare policy in Iraq, where palliative care has not yet been fully integrated into the health system. By investing in nurse education and institutionalizing palliative care training, Iraq can take an essential step toward improving the quality of life for children with cancer and their families.

Future research should build upon the findings of this study by expanding the scope of investigation to include multi-center studies across different regions of Iraq. Such studies would allow for a more comprehensive evaluation of the effectiveness of educational interventions in diverse institutional and cultural contexts. Longitudinal research is also needed to assess the durability of training outcomes, particularly in terms of long-term retention of knowledge and skills, as well as the direct impact of improved nursing competence on patient- and family-centered outcomes, including symptom control, psychological well-being, and satisfaction with care. Furthermore, future studies should explore cost-effective and scalable training strategies, such as simulation-based education, e-learning platforms, and blended learning approaches, to ensure the sustainability of pediatric palliative care education in resource-limited settings.

### **Recommendations**

Based on the findings of this study, several recommendations can be proposed to strengthen nurses' competence in pediatric palliative care in Iraq. At the clinical level, there is an immediate need to implement ongoing in-service training programs within hospitals to address the existing gaps in knowledge and skills among practicing oncology nurses. Such programs would ensure that nurses are adequately prepared to manage the complex physical, psychosocial, and emotional needs of children with cancer and their families. At the educational level, integrating pediatric palliative care into undergraduate nursing curricula is essential to systematically prepare future nurses with foundational competencies before entering clinical practice. In the longer term, establishing a national framework for pediatric palliative care is strongly recommended. This framework should be supported by standardized Arabic-language guidelines and training manuals to promote consistency and cultural relevance across healthcare institutions. At the policy level, national nursing councils

and the Iraqi Ministry of Health could play a pivotal role by mandating structured pediatric palliative care education as part of continuing professional development requirements. Academic institutions may further support this effort by adopting pediatric palliative care as a mandatory module within nursing programs. In addition, partnerships with international organizations, such as the World Health Organization and the International Children's Palliative Care Network, could provide valuable technical support and context-specific training resources to facilitate sustainable implementation.

### **Conflict of Interest**

The authors declare that there are no conflicts of interest related to this study.

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