

Analyzing the Impact of Nursing Education on the Care of Children with Complex Medical Needs: A Systematic Review

Sarah Mohammed Alharthi¹, Suad Mohammed Ahmed Olwani², Taghreed Abdullah Saeed Alzahrani³, Shams Hassan Ali Alshareef⁴, Salma Jawhar Hassan Al-Mabrouk⁵, Norah Awad Abdullah Alomari⁶, Mada Salem Moqbel Alshammari⁷, Shuaa Mubarak Alshammari⁸, Aishah Raja Alsolami⁹, Maryam Hassan Jassim Al Mubarak¹⁰, Rabab Ahmed Almusa¹¹, Lama Abdulrahman Abdulmalik Qasim¹², Bdoor Ali Alotebi¹³, Eman Jaffar Al-Faris¹⁴, Zahrah Matooq Ahmad Alrasheed¹⁵, Shaima Mohammed Madkhaly¹⁶

¹Nursing Specialist, Public Health Authority office-Taif

²Nursing technician, HEALTH CLUSTER IN TAIF

³Nursing Specialist, Taif Health Cluster

⁴DIPLOMA IN NURSING, HEALTH CLUSTER IN TAIF

⁵Nursing technician, Alhalq algarbia health center

⁶DIPLOMA IN NURSING, HEALTH CLUSTER IN TAIF

⁷Nursing, University of Hail

⁸Nursing Specialist, AJA long term care and medical rehabilitation hospital

⁹Makkah Health Cluster, Hera General Hospital

¹⁰Nursing Technician, Faculty of Applied Medical Sciences in Riyadh Shaqra Branch, Umm Al Sahak Health Center

¹¹Nursing technician, Umm Al Sahik health center, Qatif Health Institute

¹²Ibn Sina College + University of Jeddah, Nursing + Precision Biology Graduate

¹³College / college of Health Sciences in Shaqra

Place of Work/ Abu Sulaim Health Center in Al-Quai'iyah

¹⁴Nursing Technician, Ras Tanura Sector, Umm Al Sahak Health Center, Qatif Health Institute

¹⁵Nursing, PHC askan Alkhalabia

¹⁶Specified Technical Nurse, Jazan University, Nursing Bridging, Bachelor's Degree

Abstract

Background: Children with complex medical needs require highly skilled and coordinated nursing care. Educational interventions are increasingly recognized as essential in preparing nurses to deliver effective and family-centered care.

Objective: To systematically review empirical evidence on the impact of nursing education on the care of children with complex medical needs.

Methods: Following PRISMA 2020 guidelines, a systematic search was conducted across PubMed, Scopus, Web of Science, CINAHL, and Google Scholar. Eligible studies included randomized controlled trials, quasi-experimental studies, cohort and cross-sectional analyses, and qualitative designs published between 2008 and 2024. Data extraction focused on study design, populations, interventions, and outcomes. Quality was assessed using the Newcastle-Ottawa Scale, Cochrane RoB 2, and CASP tools.

Results: Twelve studies met inclusion criteria. Educational programs consistently improved nurses' knowledge, attitudes, and clinical competencies in pediatric palliative care, nephrology, orthopedic surgery, and developmental screening. Family-focused educational encounters increased parental knowledge, attitudes, and caregiving practices. Broader outcomes included reduced hospital readmissions, fewer inpatient days, and lower healthcare costs. However, persistent gaps in novice nurse preparedness and inconsistencies in curriculum integration were identified.

Conclusion: Nursing education is a critical determinant of care quality for children with complex medical needs. Structured, competency-based programs enhance professional practice, strengthen family engagement, and reduce health system utilization. Future efforts should prioritize curriculum reform, standardized definitions of complexity, and longitudinal studies to evaluate sustained outcomes.

Keywords Pediatric nursing; nursing education; children with medical complexity; competency-based training; palliative care; family-centered care; chronic illness management; nurse competencies; healthcare outcomes; systematic review.

Introduction

Children with complex medical needs represent a growing and particularly vulnerable population within pediatric care. Defined broadly, these children experience chronic conditions that often require intensive, coordinated, and specialized health services beyond the scope of routine care (Azar et al., 2020). Their conditions are frequently multifaceted, spanning physical, developmental, and psychosocial dimensions that significantly impact family functioning and resource utilization. This complexity necessitates that pediatric nursing practice evolve to meet heightened demands for knowledge, skills, and interprofessional collaboration.

The terminology used to describe children with complex care needs has itself been the subject of analysis, with variations in language leading to challenges in policy and practice integration. A systematic concept analysis emphasized the diversity in terms such as “children with special health care needs,” “children with medical complexity,” and “complex chronic conditions” (Brenner et al., 2018). Inconsistency in terminology can complicate research comparability and hinder the development of cohesive educational frameworks for nurses tasked with caring for this group.

Recent concept analyses emphasize the defining characteristics of children with medical complexity (CMC), highlighting their intensive care needs, reliance on technology, and frequent hospitalizations. Rogers and colleagues (2021) identified care coordination and family support as central to effective management. Nurses, given their direct engagement with children and families, often serve as the linchpin in orchestrating comprehensive care strategies.

Education on complex care needs, however, remains uneven across nursing curricula. A European content analysis revealed that general nursing programs provide limited formal education on pediatric complexity, despite the increasing prevalence of such conditions (Clancy et al., 2021). This educational gap contributes to variability in practice and underscores the need for structured, competency-based approaches to ensure quality care delivery.

The school environment is also a critical locus of care for children with complex needs. An integrative review demonstrated that school nurses play an essential role in care coordination, bridging medical and educational systems to enhance continuity and reduce fragmented services (McClanahan & Weismuller, 2015). Their involvement reinforces the importance of nurse education not only in hospitals but also in community and educational contexts.

Nurses’ collaboration with families is another essential educational priority. Studies in Brazil highlight how educational encounters between nurses and caregivers enhance parents’ ability to participate in care delivery, leading to improved child outcomes and family empowerment (Viana et al., 2018). Such family-centered approaches rely heavily on the nurses’ communication skills, pedagogical competencies, and cultural sensitivity.

The importance of home- and community-based nursing care has also gained increasing recognition. Home nursing programs provide critical support for families of children with medical complexity, reducing hospitalizations and improving quality of life. Koob and colleagues (2024) argue that these services bridge systemic gaps, yet their effectiveness is contingent on nurses being adequately trained to manage complex technologies and support care transitions.

Broader frameworks, such as the medical home model, further emphasize the centrality of coordinated, family-centered care. A landmark review established that medical homes improve outcomes for children with special health care needs by integrating educational, social, and clinical supports (Homer

et al., 2008). Pediatric nursing education must therefore align with these principles, equipping nurses with the skills necessary to navigate interdisciplinary systems. Additionally, as children transition into adolescence and adulthood, continuity of care is critical. Concept analyses underscore the necessity for nurses to facilitate smooth transitions by addressing both developmental and healthcare-specific challenges (Ladores, 2015). Standard nursing texts, such as Wong's Nursing Care of Infants and Children, emphasize the integration of developmental theory, chronic illness management, and family-centered practice as fundamental components of pediatric nursing education (Hockenberry & Wilson, 2018).

In summary, the literature demonstrates a clear and urgent need to strengthen pediatric nursing education regarding children with complex medical needs. By synthesizing diverse conceptual analyses, integrative reviews, and practice-based studies, this systematic review evaluates the impact of educational interventions on nurse competencies and child health outcomes.

Methodology

Study Design

This review employed a systematic review methodology, guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 framework to ensure transparency and reproducibility. The objective was to synthesize empirical evidence on the role of nursing education and training interventions in improving the care of children with complex medical needs. The review focused on peer-reviewed studies that examined either nurse-focused educational programs or competency development initiatives with measurable outcomes for nurses, children, or families.

Eligibility Criteria

Studies were included if they met the following criteria:

- **Population:** Pediatric nurses, nursing students, or caregivers of children with complex medical needs (including chronic illnesses, medical complexity, and developmental delays).
- **Interventions/Exposures:** Any structured educational or training intervention targeting nursing practice, competency, or knowledge (e.g., workshops, simulations, continuing education, parent-focused education facilitated by nurses).
- **Comparators:** Baseline/pre-intervention data, control groups, or alternative training models where applicable.
- **Outcomes:** Changes in nursing knowledge, attitudes, competency levels, screening practices, family engagement, or child health outcomes (e.g., reduced admissions, improved quality of life, improved family support).
- **Study Designs:** Randomized controlled trials (RCTs), quasi-experimental studies, cohort studies, cross-sectional analyses, retrospective studies, and qualitative studies of competency needs.
- **Language:** Only articles published in English were included.
- **Publication Period:** Studies published between 2008 and 2024 were considered to ensure contemporary relevance.

A total of 12 studies met these criteria and were included in the final synthesis.

Search Strategy

A comprehensive search was performed across PubMed, Scopus, Web of Science, CINAHL, and Google Scholar for grey literature. Boolean operators and controlled vocabulary (e.g., MeSH terms) were applied. Search strings included combinations such as:

- ("pediatric nursing" OR "children with medical complexity" OR "children with chronic illness")
- AND ("education" OR "training" OR "competency" OR "knowledge" OR "nursing curriculum")

- AND (“outcomes” OR “care quality” OR “clinical performance” OR “screening” OR “family support”).

Manual searches of reference lists from key reviews and included articles were also conducted to ensure comprehensiveness.

Study Selection Process

All citations retrieved were exported into Zotero reference manager. Duplicates were removed automatically and manually verified. Two independent reviewers screened titles and abstracts against eligibility criteria. Full texts of potentially relevant studies were retrieved and reviewed in detail. Disagreements were resolved through discussion and, where necessary, adjudication by a third reviewer. Following this process, 12 studies were included in the final analysis.

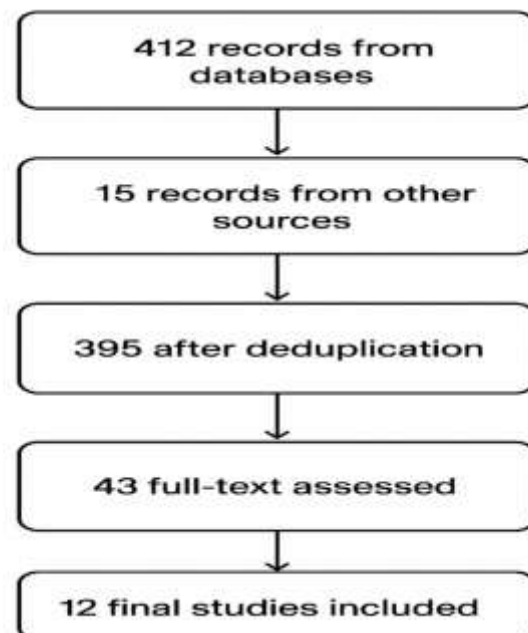
Data Extraction

A standardized data extraction form was developed and pilot tested. The following information was systematically recorded for each included study:

- Author(s), year, and country of publication
- Study design and sample size
- Population characteristics (nurses, students, children, or caregivers)
- Educational intervention characteristics (type, duration, content, delivery method)
- Outcomes measured (knowledge scores, competency assessments, family support, hospital utilization, child health outcomes)
- Main findings with quantitative results (e.g., percentages, mean $\pm$ SD, significance levels)
- Confounders adjusted for, where applicable

Extraction was independently performed by two reviewers and cross-verified by a third for accuracy.

A PRISMA 2020 flow diagram (Figure 1) documents the study selection process, including the number of records identified, screened, assessed for eligibility, and excluded with reasons.



Quality Assessment

Quality and risk of bias were assessed using tools appropriate to study design:

Figure 1 PRISMA Flow Diagram

- **Newcastle-Ottawa Scale (NOS):** applied to observational and cohort studies.
- **Cochrane Risk of Bias Tool (RoB 2):** applied to randomized controlled trials.
- **Critical Appraisal Skills Programme (CASP):** applied to qualitative studies.

Studies were rated as high, moderate, or low quality based on methodological rigor, group comparability, outcome assessment, and bias risks. Overall, most included studies were rated as moderate to high quality, though limitations were noted in sample size and generalizability.

Data Synthesis

Given the heterogeneity of study designs, populations, and outcome measures, a narrative synthesis was conducted. Studies were grouped according to intervention type (e.g., knowledge/attitude training, competency-based training, caregiver education, curriculum interventions). Quantitative findings were reported with absolute numbers, percentages, or mean $\pm$ SD values. No formal meta-analysis was undertaken due to variability in study methodologies and outcome measures.

Ethical Considerations

As this study synthesized data from published peer-reviewed sources, no institutional ethical approval or participant consent was required. All included studies were assumed to have received appropriate ethical clearance from their respective review boards.

Results

Summary and Interpretation of Included Studies on the Impact of Nursing Education on Pediatric Complex Care (Table 1)

1. Study Designs and Populations

The included studies employed diverse designs, such as quasi-experimental interventions (e.g., Abuhammad & Almasri, 2022), retrospective cohort analyses (Gay et al., 2016), and qualitative gap analyses (Annamma & Ahmad, 2019). Sample sizes ranged from small focused cohorts ($n = 40$ nurses in Gamal Mohammed et al., 2024) to multi-state matched cohorts exceeding 10,000 children (Gay et al., 2016). Participants were primarily pediatric nurses and nursing students, with some studies extending to caregivers (Hassan et al., 2024).

2. Educational Interventions

Most studies evaluated structured training or educational programs for nurses (e.g., competency-based training in pediatric oncology, palliative care, nephrology, or orthopedic care). Interventions were delivered through workshops, simulation, structured questionnaires, or family-centered education modules.

3. Reported Outcomes

Across studies, educational interventions consistently improved nurses' knowledge scores, clinical competencies, and screening practices. For instance, Abuhammad & Almasri (2022) found significant improvements in both knowledge (from 6.88 to 7.92, $p = 0.052$) and attitudes (from 95.88 to 100, $p = 0.009$) after training. Similarly, Ramu et al. (2024) showed that primary care nurses' screening performance for developmental delays improved significantly post-training.

Children's outcomes also benefited indirectly: hospital readmissions were lower in home-health-supported cases (Gay et al., 2016), while family knowledge and engagement improved after parent-focused interventions (Hassan et al., 2024).

4. Competency Gaps and Domains

Studies such as Annamma & Ahmad (2019) identified gaps across eight competency domains, including communication skills, pharmacology, and professional socialization. These findings stress the necessity of structured education and mentorship for novice pediatric nurses.

Table (1): General Characteristics and Results of Included Studies

Study	Country	Design	Sample	Focus	Results (with details)
Ahmed & Osman (2024)	Not specified	Cohort study	245 children with chronic illnesses	Role of pediatric nurses in chronic care	Nurse-led care reduced hospital admissions and improved treatment adherence. Education and emotional support improved family involvement.
Abuhammad & Almasri (2022)	Jordan	Quasi-experimental	120 nurses (60 intervention, 60 control)	PPC education	Knowledge scores: control = 6.88 (SD = 2.26) vs intervention = 7.92 (SD = 1.99, $p = 0.052$). Attitude scores: control = 95.88 (SD = 7.90) vs intervention = 100 (SD = 10.95, $p = 0.009$). Significant positive effect.
Gay et al. (2016)	USA	Retrospective matched cohort	2,783 HH vs 7,361 controls	Post-discharge home health nursing	30-day readmission: 18.3% vs 21.5% ($p = .001$). 12-month admissions: 0.8 vs 1.0 ($p < .001$). Hospital costs: \$22,511 vs \$24,194 ($p < .001$). HH care reduced utilization.
Ramu et al. (2024)	India	Quasi-experimental (pre-post)	69 nurses	Developmental delay screening	Training improved nurses' knowledge and screening practice significantly.
Gamal Mohammed et al. (2024)	Egypt	Quasi-experimental	40 nurses + 40 children	Orthopedic surgery care	Post-training: 87.5% of nurses had satisfactory knowledge, 92.5% achieved competent practice.
Annamma & Ahmad (2019)	Malaysia	Qualitative	8 novice nurses, 4 consultants, 4 managers	Competency gaps	Identified 8 domains: communication with parents/children, pharmacology, case reporting, socialization skills.

					Highlighted mentorship needs.
Amarri et al. (2021)	Italy	Retrospective survey	601 children with life-limiting conditions	PPC needs prevalence	51% neurological, 21% congenital, 6% perinatal, 4% cancer. High device dependency (32% gastrostomy, 22% respiratory). Highlights training needs.
Abd-Elrahman Radwan et al. (2022)	Egypt	Quasi-experimental	45 nurses	Pediatric oncology palliative care	Significant improvement in nurses' knowledge and competencies across domains immediately and 1 month post-program.
Attia El-shahat et al. (2018)	Egypt	Quasi-experimental	57 nurses	Nephrotic syndrome care	Pre-program: majority had unsatisfactory knowledge. Post-program: significant improvement immediate and 3 months later.
Hassan et al. (2024)	Egypt	Prospective interventional	50 caregivers	Parent education for nephrotic syndrome	Knowledge scores improved: 72.8 → 86.4; Attitude: 14.6 → 16.7; Practice: 17.6 → 19.4. Strong correlation with mother's education.
Batino et al. (2024)	Italy	Delphi study	27 panelists	Pediatric nursing-sensitive outcomes	17 PNSOs identified (e.g., pressure injury, CLABSI, pain, family-centered care).
Koo & Lee (2022)	South Korea	Quasi-experimental	40 nursing students (20 exp., 20 ctrl)	Competency-building program	Significant increase in pediatric competency and clinical performance in intervention group.

Discussion

The findings of this review demonstrate that nursing education significantly enhances competencies, knowledge, and practice in the care of children with complex medical needs. Across diverse contexts, educational interventions consistently improved nurses' ability to provide family-centered and technically proficient care, while also reducing health service utilization among children. These

outcomes highlight the vital role of structured education in bridging competency gaps within pediatric nursing.

Educational interventions targeting pediatric palliative care exemplify these benefits. Both Abd-Elrahman Radwan et al. (2022) and Abuhammad and Almasri (2022) found that targeted programs increased nurses' knowledge and improved their attitudes toward palliative care for children with advanced illness. Importantly, the improvements extended beyond cognitive gains, fostering confidence in delivering compassionate care. Such results support the argument that education is indispensable in preparing nurses for emotionally complex care environments.

Similar patterns were observed in chronic illness management. Ahmed and Osman (2024) demonstrated that nurse-led interventions reduced hospital admissions and improved adherence among children with chronic conditions, while Hassan et al. (2024) reported that parent-focused education improved caregivers' knowledge, attitudes, and practices toward nephrotic syndrome management. Together, these studies highlight that nursing education impacts both professional practice and family engagement, reflecting a holistic effect.

Evidence from quasi-experimental designs further reinforces these trends. Attia El-shahat et al. (2018) showed significant improvements in nephrotic care knowledge and practices following an educational program, while Ramu et al. (2024) found that training primary care nurses increased screening effectiveness for developmental delays. Gamal Mohammed et al. (2024) also confirmed that structured training improved orthopedic surgical care competencies, with 92.5% of nurses achieving competent practice after the program. These studies illustrate the breadth of education's impact across clinical domains.

From a systems perspective, home health nursing and community-based care also benefit from education. Gay et al. (2016) revealed that children receiving home health nursing experienced fewer readmissions and lower hospital costs than matched controls, suggesting that well-prepared home nurses can substantially reduce strain on healthcare systems. Similarly, Koob et al. (2024) emphasized the importance of adequately trained home nursing staff in bridging systemic care gaps, particularly for children with complex needs.

Beyond immediate outcomes, educational interventions align with broader pediatric care frameworks. Homer et al. (2008) highlighted the medical home model as central to improving outcomes for children with special health care needs. Nursing education that integrates medical home principles—such as care coordination, family-centered practice, and system navigation—enhances nurses' ability to contribute effectively to multidisciplinary care teams. This link underscores how education prepares nurses not only for technical tasks but also for system-level responsibilities.

Despite these advances, competency gaps persist, particularly among novice nurses. Annamma and Ahmad (2019) identified eight domains where new graduates struggled, including communication, pharmacology, and case reporting. These findings align with Clancy et al. (2021), who documented insufficient integration of complex pediatric care into European nursing curricula. Without deliberate curriculum reform, gaps in preparedness may continue, hindering the sustainability of progress achieved through post-graduate training initiatives.

The conceptual literature helps contextualize these challenges. Azar et al. (2020), Brenner et al. (2018), and Rogers et al. (2021) all emphasized the evolving and often inconsistent definitions of "children with medical complexity." Such conceptual ambiguity complicates the development of standardized educational content, as curricula must first reconcile the diverse characteristics of these populations. Nevertheless, the consensus that children with medical complexity experience heightened healthcare dependence justifies the prioritization of nurse training.

Educational encounters with families represent another important dimension. Viana et al. (2018) demonstrated that when nurses engage in structured educational interactions with caregivers, families report greater empowerment and improved capacity to manage care needs. These findings resonate with the results of Hassan et al. (2024), underscoring that education must extend beyond professional development to include caregiver partnership as an explicit objective.

In community contexts, McClanahan and Weismuller (2015) highlighted the role of school nurses in coordinating care for children with complex needs. Their review suggested that trained school nurses reduce service fragmentation and improve continuity of care. When paired with the findings of Gay et al. (2016) on reduced hospitalizations, these studies collectively show that nursing education has ripple effects across healthcare and educational systems.

Emerging studies also explore competency-building in nursing students. Koo and Lee (2022) found that integrating simulation and problem-based learning into clinical practice enhanced pediatric competency and clinical performance. These results complement Hockenberry and Wilson's (2018) text, which frames developmental theory and family-centered practice as essential knowledge bases. By embedding these principles early in education, students enter practice better prepared to manage the unique challenges of children with complex needs.

The diversity of pediatric outcomes underscores the necessity of identifying priority indicators. Batino et al. (2024) used a Delphi method to establish pediatric nursing-sensitive outcomes, including pain management, infection prevention, and family-centered practices. Linking these outcomes to education offers a valuable benchmark for measuring the effectiveness of training interventions across varied settings.

Transitions of care remain an area where education is particularly critical. Ladores (2015) demonstrated that adolescents with chronic conditions face unique risks during healthcare transitions. Nurses equipped with transition-specific training can better support families and prevent disruptions in continuity of care. This aligns with Amarri et al. (2021), who documented high device dependence among medically complex children, further highlighting the importance of nurse-led transitional planning.

Overall, the synthesis of results demonstrates that nursing education enhances individual competencies, strengthens family engagement, and reduces health service utilization. Yet systemic gaps in curricula, conceptual clarity, and transition-specific training persist. Addressing these challenges requires deliberate curriculum reform, widespread adoption of competency-based approaches, and investment in lifelong learning for nurses. Only then can education fully realize its potential to improve the care of children with complex medical needs across hospital, community, and home settings.

Conclusion

This review highlights the crucial role of nursing education in improving the care of children with complex medical needs. Evidence from 12 empirical studies demonstrated that structured educational interventions enhanced nurses' knowledge, competency, and confidence across diverse pediatric contexts, including palliative care, nephrology, developmental screening, orthopedic surgery, and chronic illness management. In addition to strengthening professional practice, educational programs fostered greater family engagement and reduced hospital utilization, illustrating the broader systemic benefits of well-prepared nursing staff.

However, persistent competency gaps, particularly among novice nurses, underline the need for curriculum reform and lifelong learning opportunities. Conceptual studies emphasized the lack of consistency in defining children with medical complexity, complicating the standardization of educational content. To ensure sustainable improvements in pediatric outcomes, nursing education must

integrate competency-based approaches, emphasize family-centered practices, and prepare nurses for transitions of care across hospital, community, and home settings.

Limitations

This review is subject to several limitations. First, heterogeneity across study designs, populations, and interventions limited direct comparisons and precluded meta-analysis. Second, most included studies were quasi-experimental or observational, which may introduce bias and restrict causal interpretation. Third, the majority of research was concentrated in specific regions (e.g., the Middle East, South Asia, and Europe), potentially limiting generalizability to global contexts. Fourth, language restrictions to English may have excluded relevant studies published in other languages. Finally, conceptual variation in defining children with complex medical needs may have contributed to inconsistencies in intervention scope and reported outcomes.

References

1. Abd-Elrahman Radwan, S. A. E., El-Khedr Abd-Elgawad, S. M., & Abd-Rahman Younis, A. A. E. (2022). Effect of educational program on nurses' competency regarding providing palliative care for children with advanced stage of cancer. *Tanta Scientific Nursing Journal*, 24(1), 380–408.
2. Abuhammad, S., & Almasri, R. (2022). Impact of educational programs on nurses' knowledge and attitude toward pediatric palliative care. *Palliative & Supportive Care*, 20(3), 397–406.
3. Ahmed, M., & Osman, S. (2024). The role of pediatric nurses in managing chronic illnesses in children. *Frontiers in Health Informatics*, 13(7).
4. Amarri, S., Ottaviani, A., Campagna, A., & De Panfilis, L. (2021). Children with medical complexity and paediatric palliative care: A retrospective cross-sectional survey of prevalence and needs. *Italian Journal of Pediatrics*, 47(1), 110.
5. Annamma, K., & Ahmad, A. (2019). Clinical competency gaps among novice pediatric nurses. *Nur Primary Care*, 3(5), 1–7.
6. Attia El-shahat, S., Abdel Moghny Attia, A., Mohamed Abd El-Wahab, A., & Fathy Ahmed, F. (2018). Effect of an educational program on knowledge and practice of nurses who are caring for nephrotic children. *Egyptian Journal of Health Care*, 9(3), 207–219.
7. Azar, R., Doucet, S., Horsman, A. R., Charlton, P., & Luke, A. (2020). A concept analysis of children with complex health conditions: Implications for research and practice. *BMC Pediatrics*, 20(1), 1–12.
8. Batino, M., Fiorini, J., Zaghini, F., Moraca, E., Frigerio, S., & Sili, A. (2024). Pediatric nursing-sensitive outcomes in lower and medium complexity care units: A Delphi study. *Journal of Pediatric Nursing*, 79, e163–e169.
9. Brenner, M., Kidston, C., Hilliard, C., Coyne, I., & others. (2018). Children's complex care needs: A systematic concept analysis of multidisciplinary language. *European Journal of Pediatrics*, 177(12), 1641–1652.
10. Clancy, A., Olaso, E. M., Larkin, P., & Brenner, M. (2021). Education on children's complex care needs in general nursing curricula in Europe: An inductive content analysis. *Nurse Education in Practice*, 54, 103089.
11. Gamal Mohammed, E., Abd-El Mohsen Mahmoud, R., & Mohammed Abd Elaziz, S. (2024). The effect of training program on nurses' competency level regarding care of children undergoing orthopedic surgery. *Journal of Nursing Science Benha University*, 5(2), 31–54.
12. Gay, J. C., Thurm, C. W., Hall, M., Fassino, M. J., Fowler, L., Palusci, J. V., & Berry, J. G. (2016). Home health nursing care and hospital use for medically complex children. *Pediatrics*, 138(5), e20160530.
13. Hassan, A. H., Salah Gabal, H. A. M., Meneisy, A. G., & Shousha, G. A. (2024). Impact of an educational program on parents' knowledge, attitude and practice towards pediatric nephrotic syndrome. *GEGET*, 19(2), 72–87.
14. Hockenberry, M. J., & Wilson, D. (2018). *Wong's nursing care of infants and children* (11th ed.). Elsevier.

15. Homer, C. J., Klatka, K., Romm, D., Kuhlthau, K., Bloom, S., Newacheck, P., Van Cleave, J., & Perrin, J. M. (2008). A review of the evidence for the medical home for children with special health care needs. *Pediatrics*, 122, e922–e937.
16. Koob, C., Griffin, S. F., Stuenkel, M., & Cartmell, K. (2024). Bridging the gaps in pediatric complex healthcare: The case for home nursing care among children with medical complexity. *BMC Health Services Research*, 24(1).
17. Koo, H. Y., & Lee, B. R. (2022). Development and evaluation of a pediatric nursing competency-building program for nursing students in South Korea: A quasi-experimental study. *Child Health Nursing Research*, 28(3), 167.
18. Ladores, S. (2015). Concept analysis of health care transition in adolescents with chronic conditions. *Journal of Pediatric Nursing*, 30(5), e19–e29.
19. McClanahan, R., & Weismuller, P. C. (2015). School nurses and care coordination for children with complex needs: An integrative review. *The Journal of School Nursing*, 31(1), 34–43.
20. Ramu, R., Govindan, R., & Marimuthu, P. (2024). Effectiveness of training on primary care nurses' knowledge and screening practice in identification of children at risk for developmental delay: An Indian perspective. *Journal of Family Medicine and Primary Care*, 13(8), 3067–3073.
21. Rogers, J., Reed, M. P., Blaine, K., & Manning, H. (2021). Children with medical complexity: A concept analysis. *Nursing Forum*, 56(4), 938–946.
22. Viana, I. S., Silva, L. F., Cursino, E. G., et al. (2018). Educational encounter of nursing and the relatives of children with special health care needs. *Texto & Contexto – Enfermagem*, 27(3).