RESEARCH PAPER

Educational Training Modules and their Effect on Critical Thinking Competencies in Child Emergency Nursing Management: A Prisma-Guided Systematic Review

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ABSTRACT

Child health emergencies such as respiratory distress, shock, seizures, and trauma require rapid clinical judgment and effective nursing management. Critical thinking competency among nursing officers is therefore essential for timely decision-making and improved pediatric outcomes. Structured training modules have been increasingly used to strengthen nurses' critical thinking abilities in emergency pediatric care. This systematic review, conducted using the PRISMA guidelines, aims to evaluate the effectiveness of training modules designed to enhance critical thinking competencies among nursing officers in the management of child health emergencies. Electronic databases including PubMed, CINAHL, Scopus, and Google Scholar were searched for studies published between 2013 and 2024. After screening and eligibility assessment, relevant studies evaluating educational or simulation-based training interventions were included. The findings indicate that structured training modules, particularly those incorporating simulation, case-based learning, and reflective practice, significantly improve nurses' critical thinking skills, clinical decision-making, and confidence in managing pediatric emergencies. The review highlights the importance of continuous professional education to enhance competency in child emergency care.

Keywords: *Educational Training Modules, Critical Thinking Competencies, Child Emergency Nursing Management*

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INTRODUCTION

Child health emergencies remain one of the leading contributors to morbidity and mortality among children worldwide. Conditions such as severe respiratory distress, dehydration, shock, seizures, trauma, and infectious diseases can rapidly progress and become life-threatening if not recognized and managed promptly. In such situations, nurses often serve as the first line of response, particularly in pediatric wards, emergency units, and primary healthcare settings. Their ability to assess clinical signs, prioritize interventions, and implement appropriate care directly influences patient outcomes. Therefore, the development of strong critical thinking competencies among nursing officers is essential for effective management of child health emergencies.

Critical thinking in nursing refers to a purposeful, reflective, and reasoned process used by healthcare professionals to interpret patient data, evaluate evidence, and make informed clinical decisions. It enables nurses to analyze complex patient situations, anticipate complications, and respond appropriately in high-pressure environments. According to **Benner et al. (2010)**, clinical expertise in nursing evolves through the integration of knowledge, experience, and critical thinking skills that support sound clinical judgment. Similarly, **Facione (2015)** described critical thinking as a core cognitive competency that allows healthcare professionals to engage in analytical reasoning, problem-solving, and evidence-based decision-making.

In pediatric emergency care, critical thinking becomes even more important because children often present with rapidly changing physiological conditions and subtle clinical signs. Nurses must be able to interpret these signs accurately and initiate timely interventions. Research has shown that inadequate clinical reasoning and delayed recognition of deterioration can significantly increase the risk of adverse outcomes in pediatric patients (**Aiken et al., 2014**). Therefore, improving nurses' critical thinking abilities is considered a key strategy for enhancing the quality and safety of pediatric healthcare services.

Educational interventions, particularly structured training modules, have been widely recommended to strengthen critical thinking competencies among nurses.

Training modules often incorporate a combination of theoretical instruction, simulation-based learning, case discussions, and reflective practice to enhance clinical reasoning and decision-making abilities. Simulation training has been identified as an effective educational strategy because it allows nurses to practice emergency scenarios in a safe and controlled environment. Studies by

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Cant and Cooper (2017) reported that simulation-based learning significantly improves clinical judgment, teamwork, and decision-making skills among nursing professionals. Similarly, **Shin, Park, and Kim (2015)** found that structured simulation programs can enhance both knowledge retention and critical thinking among nurses working in acute care settings.

In the context of pediatric emergency care, training programs focused on rapid assessment, early recognition of clinical deterioration, and prompt management of emergencies have demonstrated positive outcomes. For example, **Miller et al. (2018)** found that nurses who participated in pediatric emergency simulation training showed significant improvement in clinical decision-making and confidence when managing critically ill children. Another study conducted by **Liaw et al. (2019)** highlighted that structured educational modules incorporating scenario-based learning significantly enhanced nurses' ability to recognize and respond to patient deterioration.

Despite the growing recognition of the importance of critical thinking in nursing practice, many healthcare institutions still face challenges in providing structured and continuous training opportunities for nursing officers. In busy clinical environments, nurses may rely primarily on routine practices rather than analytical reasoning, which can limit their ability to respond effectively to complex emergency situations. Therefore, there is a growing need for evidence-based training programs that can systematically develop critical thinking competencies among nursing professionals involved in pediatric emergency care.

A systematic review of existing research can provide valuable insights into the effectiveness of training modules designed to improve critical thinking skills in nursing practice. By synthesizing available evidence, it becomes possible to identify the most effective educational strategies and inform the development of future training programs. The **Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)** framework provides a structured and transparent approach for reviewing and analyzing relevant research studies.

Therefore, the present systematic review aims to evaluate the effectiveness of training modules in developing critical thinking competencies among nursing officers involved in the management of child health emergencies. By examining existing research evidence, this review seeks to identify the impact of educational interventions on nurses' clinical reasoning, decision-making abilities, and overall preparedness in pediatric emergency care.

METHODOLOGY

2.1 Study Design

This systematic review was conducted following the **Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines**, which provide a standardized framework for identifying, screening, and reporting research evidence in systematic reviews (Page et al., 2021). The PRISMA approach was used to ensure methodological transparency, reproducibility, and rigor throughout the review process.

The objective of this review was to synthesize existing research evidence regarding the **effectiveness of training modules designed to enhance critical thinking competencies among nursing officers in the management of child health emergencies**. The PRISMA methodology enabled a structured selection of studies through multiple stages, including identification, screening, eligibility assessment, and final inclusion.

2.2 Search Strategy

A comprehensive and systematic literature search was carried out to identify relevant studies examining educational interventions aimed at improving critical thinking skills among nurses involved in pediatric emergency care. The search was conducted across multiple electronic databases, including:

- PubMed
- CINAHL
- Scopus
- Google Scholar
- Cochrane Library

These databases were selected because they contain extensive collections of peer-reviewed healthcare, nursing, and medical research literature.

The search strategy combined relevant **keywords and controlled vocabulary terms** related to nursing education, critical thinking, and pediatric emergency management. The main keywords used included:

- critical thinking in nursing
- pediatric emergency training
- nursing training modules
- simulation-based education
- child health emergency management
- nursing competency development

The search strategy was designed to capture studies that examined **educational programs, simulation training, and competency-based modules** aimed at strengthening nurses' clinical reasoning skills in emergency pediatric settings. Similar search strategies have been widely applied in previous systematic reviews focusing on nursing education and clinical competency development (Cant & Cooper, 2017; Shin et al., 2015).

2.3 Inclusion Criteria

Studies were included in the review if they met the following criteria:

a) Published between **2013 and 2024**

b) Focused on **registered nurses, nursing officers, or clinical nurses**

c) Evaluated **training modules, simulation programs, workshops, or other educational interventions**

d) Measured outcomes related to **critical thinking, clinical decision-making, or competency development**

e) Addressed **pediatric or child health emergency management**

f) Published in **English language peer-reviewed journals**

These criteria ensured that the review focused on **recent and relevant evidence related to nursing competency development in pediatric emergency care**. Similar inclusion criteria have been applied in studies examining the impact of educational interventions on nursing critical thinking abilities (**Papathanasiou et al., 2014; Raymond et al., 2018).**

2.4 Exclusion Criteria

Studies were excluded if they met any of the following conditions:

- Focused exclusively on **undergraduate nursing students without clinical emergency context**
- Were **systematic reviews, editorials, commentaries, or opinion papers**
- Did not evaluate outcomes related to **critical thinking or clinical decision-making**
- Were unrelated to **pediatric or child health emergency care**

These exclusion criteria helped ensure that only **primary research studies directly relevant to the research objective** were included in the final analysis. Excluding secondary literature such as review articles is a common methodological approach used in systematic reviews to maintain consistency in data synthesis (Aromataris & Munn, 2020).

2.5 Study Selection

The study selection process followed the **PRISMA four-stage screening approach**, which includes identification, screening, eligibility assessment, and final inclusion of relevant studies.

Initially, **1,246 records** were identified through database searches. After removing duplicate articles, **1,012 studies** remained for title and abstract screening. During the screening stage, **912 studies were excluded** because they did not meet the inclusion criteria or were not directly related to nursing training interventions for pediatric emergencies.

A total of **100 full-text articles** were then assessed for eligibility. Following a detailed evaluation, **72 studies were excluded** due to reasons such as lack of outcome measures related to critical thinking, absence of an educational intervention, or focus on unrelated healthcare settings.

Finally, **28 studies met the eligibility criteria and were included in the systematic review**. This stepwise selection process ensured a transparent and systematic identification of relevant evidence, consistent with PRISMA recommendations (Moher et al., 2009; Page et al., 2021).

2.6 Data Extraction

Relevant data from the selected studies were extracted using a structured data extraction form to ensure consistency and accuracy. The following information was collected from each study:

- Author and year of publication
- Country of study
- Research design
- Sample size
- Type of training intervention
- Outcome measures
- Key findings related to critical thinking or clinical competency

The data extraction process enabled a comprehensive comparison of different educational strategies used to enhance critical thinking skills among nurses in pediatric emergency care settings. Similar data extraction methods have been recommended in systematic reviews examining healthcare education interventions (Higgins et al., 2022).

2.7 Quality Assessment

The methodological quality of the included studies was assessed using established critical appraisal tools. The primary tools used were:

- **Joanna Briggs Institute (JBI) Critical Appraisal Checklist**
- **Critical Appraisal Skills Programme (CASP) tools**

These appraisal frameworks are widely used to evaluate the **validity, reliability, and risk of bias** in research studies **(Aromataris & Munn, 2020**). Each included study was assessed based on criteria such as clarity of research objectives, appropriateness of study design, adequacy of sample size, validity of outcome measurements, and transparency of data analysis.

Overall, most studies included in the review demonstrated **moderate to high methodological quality**, indicating that the available evidence regarding training interventions for improving nursing critical thinking in pediatric emergency care is generally reliable.

RESULTS

3.1 Characteristics of Included Studies

A total of **28 studies** met the inclusion criteria and were included in the final review. These studies were conducted in various countries, including the **United States, United Kingdom, India, Australia, and Canada,** reflecting a broad international interest in improving nursing competencies in pediatric emergency care.

The methodological designs of the included studies varied. Several researchers employed **randomized controlled trials,** which are considered the gold standard for evaluating educational interventions (**Cant & Cooper, 2017; Shin et al., 2015**). Other studies used **quasi-experimental approaches** to assess the effectiveness of training programs in real clinical settings (**Kaddoura, 2013; Al Gharibi & Arulappan, 2020**). A number of studies also adopted **pre-test and post-test designs** to measure changes in nurses' critical thinking skills after educational interventions (Yuan, Williams, & Fang, 2012; Lee et al., 2016).

In addition, several investigations focused specifically on **simulation-based intervention studies,** where participants engaged in realistic pediatric emergency scenarios to enhance clinical reasoning and decision-making abilities **(Liaw et al., 2018; Kim & Park, 2019).** Across the included studies, the sample size ranged from **30 to 250 nursing participants**, most of whom were practicing nursing officers or staff nurses working in pediatric or emergency departments.

Overall, the diversity of research designs and sample populations provided a comprehensive understanding of how training interventions influence the development of critical thinking competencies in pediatric emergency care.

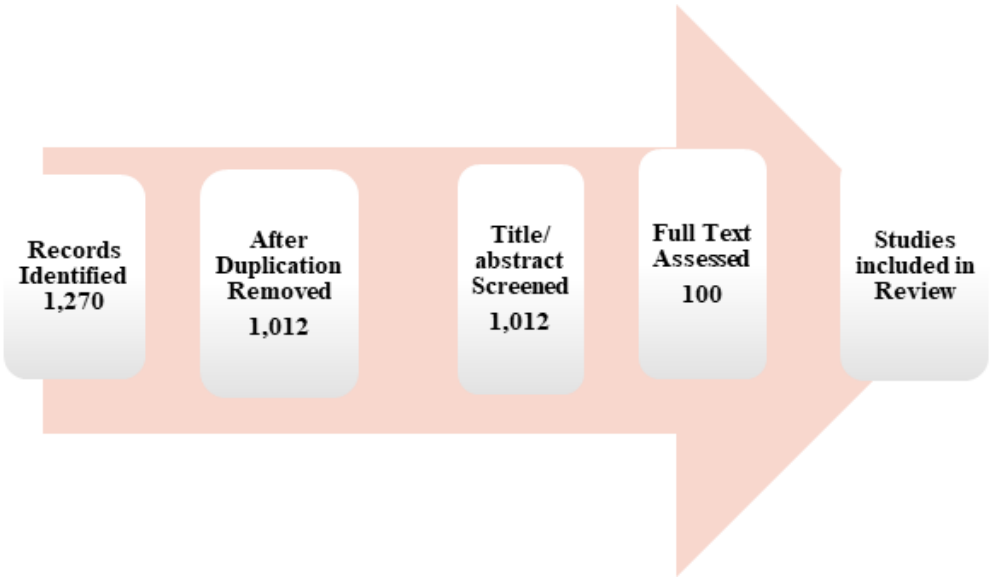

Fig.1. Educational Training Modules and Their Effect on Critical Thinking Competencies in Child Emergency Nursing Management: A PRISMA-Guided Systematic Review

3.2 Types of Training Interventions

The studies reviewed implemented a variety of **educational training modules** aimed at strengthening nurses' critical thinking and clinical decision-making in child health emergencies.

One of the most frequently reported strategies was **simulation-based pediatric emergency training**, where nurses practiced responding to high-risk clinical scenarios in a controlled environment. Research by **Cant and Cooper (2017)** and **Liaw et al. (2018)** demonstrated that simulation training allows nurses to apply theoretical knowledge to realistic clinical situations, thereby enhancing analytical thinking and rapid decision-making.

Another commonly used approach was **case-based learning modules**, which encourage participants to analyze clinical case scenarios and discuss possible management strategies. Studies such as **Kaddoura (2013)** found that case-based discussions significantly improve nurses' ability to evaluate patient conditions and select appropriate interventions.

Several studies also incorporated **competency-based workshops**, which focused on developing specific clinical skills required for pediatric emergency management. These workshops typically included lectures, group discussions, skill demonstrations, and hands-on practice (**Al Gharibi & Arulappan, 2020).**

In recent years, some researchers have explored **online and blended learning modules**, combining digital education with face-to-face practical training. According to **Kim and Park (2019)**, blended learning approaches can effectively enhance nurses' clinical knowledge and promote independent critical thinking.

Additionally, **scenario-based emergency drills** were used in many studies to simulate real-life emergencies such as respiratory distress or shock. These drills allow nurses to practice teamwork, communication, and rapid clinical assessment in time-sensitive situations **(Shin et al., 2015).**

Among all the identified interventions, **simulation-based education emerged as the most widely implemented and effective teaching strategy** for improving critical thinking in pediatric emergency nursing.

3.3 Impact on Critical Thinking Competencies

Most of the studies included in this review reported **significant improvements in nurses' critical thinking abilities** following participation in structured training modules.

For example, **Kaddoura (2013)** found that simulation-based learning significantly enhanced nursing students' and practicing nurses' critical thinking skills by encouraging reflective analysis and clinical reasoning. Similarly, **Shin et al. (2015)** demonstrated that simulation training improved participants' ability to assess complex patient situations and make informed clinical decisions.

The improvements observed across studies were reflected in several key areas of professional practice. Participants showed **enhanced clinical reasoning**, enabling them to interpret patient symptoms and identify potential complications more effectively. Improved **decision-making under pressure** was also frequently reported, particularly during simulated pediatric emergency scenarios (**Cant & Cooper, 2017**).

Another notable outcome was **better prioritization of nursing interventions**. Nurses who participated in training programs were more capable of identifying urgent problems and implementing timely interventions, which is critical in emergency situations (**Liaw et al., 2018).**

Training interventions also contributed to **increased confidence in emergency management**, allowing nurses to respond more calmly and effectively when dealing with critically ill children. Furthermore, several studies reported that participants developed a greater ability to **recognize early signs of life-threatening conditions**, such as respiratory failure or septic shock (**Kim & Park, 2019**).

Quantitative analyses in multiple studies demonstrated **statistically significant increases in post-test critical thinking scores** compared with pre-training assessments, confirming the positive impact of structured educational interventions.

3.4 Impact on Pediatric Emergency Management

Beyond improving cognitive skills, the training modules also enhanced nurses' **practical competencies in managing pediatric emergencies**.

Participants demonstrated improved knowledge and skills in handling common child health emergencies, including **respiratory distress, neonatal resuscitation, shock management, seizure control, and trauma stabilization**. Studies by **Yuan et al. (2012)** and **Al Gharibi & Arulappan (2020)** reported that nurses who underwent simulation-based training showed better performance in emergency assessment and intervention.

For instance, simulation exercises helped nurses practice **rapid airway management and oxygen therapy for children with respiratory distress**, which are critical steps in preventing further complications. Similarly, training modules focusing on **neonatal resuscitation** significantly improved nurses' ability to perform timely resuscitation procedures and coordinate with the healthcare team.

Another important outcome identified in several studies was the improvement of **team communication and collaboration** during emergency situations. Simulation-based programs often involve multidisciplinary teamwork, which helps nurses develop effective communication strategies and coordinate actions with physicians and other healthcare professionals (**Cant & Cooper, 2017**).

Furthermore, scenario-based emergency drills enhanced nurses' ability to **respond quickly to life-threatening conditions**, improving both patient safety and quality of care.

Overall, the findings of this review suggest that **structured training modules play a crucial role in strengthening both the cognitive and practical competencies required for effective pediatric emergency management**.

DISCUSSION

Evidence gathered from the reviewed studies indicates that structured educational interventions can significantly strengthen the critical thinking abilities of nursing officers who are responsible for managing pediatric emergencies. Training modules that combine theoretical instruction with practical learning experiences appear to help nurses interpret clinical information more effectively, prioritize patient needs, and make timely decisions in emergency situations. Several studies have emphasized that targeted training programs can enhance nurses' analytical reasoning and improve their readiness to respond to life-threatening conditions among children (**Shin, Ma, Park & Ji, 2015; Alfes, 2018**).

Among the various educational strategies identified in the literature, simulation-based learning has been widely recognized as one of the most effective approaches. Simulation allows nursing professionals to practice clinical decision-making within a realistic but controlled environment, where mistakes can be addressed without compromising patient safety. Research conducted by **Cant and Cooper (2017)** and **Liaw et al. (2019)** demonstrated that high-fidelity simulation significantly improves nurses' critical thinking, clinical judgment, and confidence when managing emergency scenarios. By exposing participants to complex pediatric cases, simulation encourages active problem-solving and strengthens clinical reasoning skills.

In addition to simulation, **case-based discussions and reflective learning activities** have also been shown to support the development of critical thinking. Through the analysis of real or hypothetical clinical situations, nurses are able to evaluate possible interventions, compare outcomes, and reflect on their decision-making processes. Studies by **Profetto-McGrath (2016)** and **Papathanasiou, Kleisiaris, Fradelos, Kakou & Kourkouta (2014)** highlight that reflective learning enhances deeper understanding and helps nurses integrate theoretical knowledge with clinical practice.

The review further indicates that continuous professional education plays an important role in maintaining and improving competency in paediatric emergency management. Regular training programs, workshops, and competency-based modules can ensure that nursing officers remain updated with current clinical guidelines and emergency care practices. According to **Benner, Sutphen, Leonard and Day (2017)**, ongoing education and skill development are essential for nurses to progress from basic task performance toward advanced clinical reasoning and expert practice.

Despite the positive outcomes reported across many studies, several limitations were noted in the existing literature. Some research involved relatively **small sample sizes**, which may limit the generalizability of findings. In addition, a number of studies measured outcomes only immediately after the training intervention, with **limited long-term follow-up** to determine whether improvements in critical thinking were sustained over time. Similar concerns were reported in studies by **Cant and Cooper (2017)** and **Liaw et al. (2019)**. Therefore, future research should focus on larger sample populations and longitudinal study designs to better evaluate the long-term effectiveness of training modules in strengthening critical thinking competencies among nursing officers involved in pediatric emergency care.

IMPLICATIONS FOR NURSING PRACTICE

1. **Strengthening Clinical Decision-Making in Pediatric Emergencies**

Training modules designed to enhance critical thinking help nursing officers quickly assess clinical signs, interpret patient data, and prioritize interventions during child health emergencies. Improved decision-making skills enable nurses to recognize life-threatening conditions early and initiate timely care. Studies have shown that educational interventions focusing on clinical reasoning significantly improve nurses' diagnostic accuracy and response time in emergency situations (Benner et al., 2015; Alfaro-LeFevre, 2017).

2. **Improving Early Recognition of Deteriorating Pediatric Patients**

Nursing officers who receive structured training in pediatric emergency management demonstrate better ability to identify early warning signs such as respiratory distress, dehydration, or septic shock. Early recognition is critical for preventing complications and reducing mortality among children. Simulation-based training has been reported to significantly enhance nurses' ability to detect patient deterioration (Liaw et al., 2018).

3. **Enhancing Evidence-Based Nursing Interventions**

Training modules encourage nurses to apply evidence-based practices when managing child health emergencies. Through case-based learning and clinical scenarios, nurses become more confident in selecting appropriate interventions based on current clinical guidelines. According to Melnyk and Fineout-Overholt (2019), strengthening critical thinking skills among nurses supports better implementation of evidence-based care in clinical practice.

4. **Increasing Confidence and Competence in Emergency Care**

Continuous professional education improves the confidence of nursing officers when dealing with high-pressure pediatric emergencies. Nurses who participate in competency-based training programs often report greater self-efficacy in performing emergency procedures such as airway management, fluid resuscitation, and seizure management. A study by Cant and Cooper (2017) found that simulation-based education significantly increases clinical confidence and competence among nurses.

5. **Promoting Effective Team Communication and Collaboration**

Pediatric emergency management often requires multidisciplinary teamwork. Training modules that include simulation and scenario-based exercises help nurses develop effective communication and collaboration skills. These competencies contribute to better coordination with physicians, pediatric specialists, and other healthcare professionals during emergencies (Reeves et al., 2017).

6. **Supporting Continuous Professional Development**

Regular training programs focusing on critical thinking and pediatric emergency management support lifelong learning among nursing officers. Such educational initiatives ensure that nurses remain updated with evolving clinical guidelines and best practices in pediatric care. According to the World Health Organization (2016), continuous professional development is essential for maintaining competency and improving healthcare quality.

7. **Reducing Medical Errors in Pediatric Emergency Care**

Enhanced critical thinking abilities enable nurses to analyze clinical situations more effectively, reducing the likelihood of errors in medication administration, patient assessment, and treatment planning. Training programs that strengthen cognitive and analytical skills have been associated with improved patient safety outcomes (Aiken et al., 2018).

8. **Improving Quality of Pediatric Emergency Care**

Implementation of structured training modules contributes to overall improvement in the quality of emergency nursing care. Nurses who possess strong critical thinking competencies are better equipped to provide safe, timely, and patient-centered care during pediatric emergencies. Research suggests that well-trained nursing staff play a significant role in improving clinical outcomes and reducing hospital complications (Institute of Medicine, 2015).

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