KeAi
CHINESE ROOTS
GLOBAL IMPACT

International Journal of Innovation Studies

EFFECTIVENESS OF A BASNEF MODEL–GUIDED EDUCATIONAL INTERVENTION ON NURSES' PERFORMANCE IN CARING FOR CHILDREN WITH ACUTE LUNG INJURY

Hanaa El Sayed[1] Azza Anwar Aly[2] Mervat Ali khamis[3] Hanaa M. Ahmed[4]
Assistant Professor of Pediatric Nursing, Faculty of Nursing, Menoufia University, Egypt and Associate Professor of Pediatric Nursing, Ibn Sina National College for Medical Studies KSA [1]
Assistant Professor of Medical Surgical Nursing. Faculty of Nursing, Damanhour University, Egypt[2]
Associate professor of Medical-Surgical Nursing, Ibn Sina National College for Medical Studies, KSA[2]
Professor of Obstetrics and Gynecological Nursing, Ibn Sina National College for Medical Studies KSA[3]
Assistant professor of pediatric Nursing, Faculty of Nursing, Menoufia University, Egypt[4]

Abstract

Background: Acute lung injury (ALI) is a serious pulmonary condition that commonly results from diseases such as pneumonia and sepsis. It contributes significantly to morbidity, prolonged hospitalization, reduced quality of life, and increased healthcare burden. **Aim:** This study aimed to evaluate the effectiveness of a BASNEF model–guided educational intervention on nurses' performance in caring for children with acute lung injury. **Design:** A quasi-experimental research design was utilized. **Settings:** The study was conducted in pediatric intensive care units and pediatric wards in one university hospital and three government hospitals in Menoufia, Egypt. **Sample:** A total of 100 nurses caring for children with Acute lung injuries were recruited and assigned either to the intervention group (n = 50), which received an educational program based on the BASNEF model, or to the control group (n = 50). **Tools:** Three data collection tools were used, employing structured questionnaires to assess nurses' knowledge, beliefs, attitudes, subjective norms, enabling factors, and performance in caring for children with acute pulmonary injury. **Results:** The results indicate that the BASNEF-based educational intervention had a significant positive impact on all measured domains in the experimental group compared to the control group, with statistically significant differences after the intervention ($p < 0.001$). These improvements were reflected in more accurate clinical practices and adherence to respiratory management guidelines. **Conclusion:** The BASNEF-guided educational intervention was effective in improving nurses' performance in caring for children with acute lung injuries. **Recommendation:** BASNEF-based educational programs should be incorporated into nursing training to enhance nurses' competencies and improve the quality of respiratory care provided to children with acute lung injuries.

Keywords: BASNEF Model, Nurses, Performance, Children, Acute Lung Injury.

Introduction

Acute lung injury (ALI) is an acute inflammatory lung disorder characterized by severe respiratory failure accompanied by hypoxemia and diffuse alveolar damage. It may progress to acute respiratory distress syndrome (ARDS) in critically ill children. ALI results from direct or indirect injury to lung tissue, leading to increased pulmonary vascular permeability, pulmonary edema, impaired gas exchange, and decreased lung compliance (Jabodon et al., 2019; Egan, 2020). Despite advances in pediatric critical care, ALI remains a leading cause of morbidity, mortality, prolonged hospital stays, and increased

healthcare costs among hospitalized children worldwide (Forum of International Respiratory Societies [FIRS], 2021).

Globally, ALI and ARDS continue to pose significant public health challenges due to their high morbidity and mortality rates and the associated healthcare burden. Recent epidemiological studies indicate that acute respiratory distress syndrome (ARDS) accounts for approximately 10% of intensive care unit admissions and about a quarter of patients requiring mechanical ventilation worldwide, with mortality rates ranging from 30% to 45% depending on disease severity and patient characteristics (Bos et al., 2023; Hsieh et al., 2022). In the pediatric population, pediatric acute respiratory distress syndrome (PARDS) remains a leading cause of respiratory failure in critically ill children and is associated with prolonged mechanical ventilation, extended hospital stays, and an increased risk of long-term pulmonary complications (Bhalla et al., 2023; Fernández et al., 2023). Although advances in prophylactic ventilation, prone positioning, and supportive critical care have improved outcomes, mortality remains high, particularly among severely ill and multi-organ dysfunctional patients (Bos et al., 2023; Wick et al., 2024).

The most common causes of acute lung injury in children include acute pneumonia, sepsis, aspiration, trauma, inhalation injuries, and systemic inflammatory disorders (Diamond et al., 2024). Clinical signs include acute hypoxemia, tachypnea, dyspnea, cyanosis, diffuse pulmonary infiltrates, dyspnea, and decreased lung compliance. Early diagnosis and prompt intervention are essential to prevent disease progression, reduce complications, and improve survival rates (Hsieh et al., 2022).

Management of acute lung injury is primarily supportive, focusing on improving oxygenation, minimizing lung injury, maintaining adequate tissue perfusion, and preventing complications. Current treatment approaches include oxygen therapy, mechanical ventilation with lung-protection strategies, fluid management, infection control, nutritional support, and multidisciplinary care (Geran et al., 2013; Basmad et al., 2024). Effective management requires collaboration among physicians, nurses, respiratory therapists, and other healthcare professionals to achieve optimal patient outcomes.

Nurses play a pivotal role in the management of children with acute lung injury. Their responsibilities include continuous respiratory assessment, monitoring oxygen levels and ventilation, administering oxygen therapy, managing mechanical ventilation, maintaining airway patency, preventing complications, and providing family-centered education and support (Bhala et al., 2023; Wick et al., 2024). As frontline healthcare providers, nurses are essential to implementing evidence-based interventions to improve respiratory function, reduce complications, shorten hospital stays, and enhance recovery outcomes (Bous et al., 2023; Fernández et al., 2023).

Given the complexity of managing acute lung injury, continuing professional education is essential to ensure nurses possess the knowledge and skills necessary to provide high-quality, evidence-based care. Educational interventions based on behavior change theories have proven effective in improving healthcare workers' knowledge, clinical competencies, and adherence to evidence-based guidelines (Al-Harbi et al., 2024; Li et al., 2024). One such framework is the BASNEF model, which incorporates beliefs, attitudes, Subjective Norms, and enabling factors as key determinants of behavior change. This model has been widely applied to promote positive behavioral changes and improve professional practice by addressing the cognitive, social, and environmental factors that influence behavior (Ahmed et al., 2024).

Educational programs guided by the BASNEF framework have proven effective in enhancing knowledge, fostering positive attitudes toward evidence-based care, increasing motivation through social support, improving adherence to clinical guidelines, and facilitating access to resources necessary for effective performance (Ahmad et al., 2024; Li et al., 2024). In pediatric intensive care units, BASNEF-guided educational interventions may constitute an effective strategy for enhancing nurses'

competencies in the care of children with acute lung injury. By improving nurses' knowledge, clinical skills, decision-making abilities, and commitment to evidence-based respiratory care practices, these interventions may contribute to improved patient safety, higher quality of care, reduced complications, and better clinical outcomes for children with acute lung injury (WHO, 2023; Michie et al., 2024).

Significance of the Study:

Acute lung injury (ALI) is a life-threatening condition and remains a leading cause of morbidity, mortality, prolonged hospital stays, and increased healthcare costs in critically ill children. Effective management of ALI requires early diagnosis, continuous monitoring, and the application of evidence-based respiratory care practices. Nurses play a pivotal role in providing comprehensive care for children with ALI through respiratory assessment, oxygen therapy, mechanical ventilation, infection prevention, and family education. Therefore, enhancing nurse competencies is essential for improving patient safety and clinical outcomes (Bhalla et al., 2023; Fernández et al., 2023).

Despite advancements in pediatric critical care, gaps in nurses' knowledge and performance can negatively impact the quality of care provided to children with ALI. Continuing professional development (CPD) has been identified as a key strategy for improving nursing competencies, promoting evidence-based practice, and ensuring high-quality patient care. Recent evidence indicates that structured educational interventions significantly improve nurses' clinical knowledge and skills, as well as their adherence to best practices (Al-Harbi et al., 2024; Li et al., 2024).

The BASNEF model provides a comprehensive framework for behavior change by addressing the beliefs, attitudes, Subjective Norms, and Enabling Factors that influence professional practice. Educational interventions based on the BASNEF model have demonstrated their ability to enhance knowledge, strengthen positive attitudes, improve behavioral intentions, and support effective healthcare practices (Ahmed et al., 2024).

Therefore, this study is crucial in evaluating the effectiveness of a BASNEF-guided educational intervention in improving nurse performance in the care of children with acute lung injuries. The findings may provide evidence for integrating theory-based educational programs into pediatric critical care settings, leading to improved nursing performance, enhanced quality of care, reduced complications, and better health outcomes for children with acute lung injuries (Bhala et al., 2023; Ahmed et al., 2024).

Aim of the Study

The aim of this study was to evaluate the effectiveness of a BASNEF (Beliefs, Attitudes, Subjective Norms, and Enabling Factors) Model–Guided Educational Intervention on nurses' performance in caring for children with acute lung injury.

Research Hypotheses

1. Nurses receiving the BASNEF-guided educational intervention will demonstrate significantly higher levels of knowledge regarding acute lung injury care compared to nurses in the control group.
2. Nurses in the experimental group will exhibit more positive attitudes and self-perceived standards toward the care of children with acute lung injuries after the intervention compared to nurses in the control group.

3. Nurses receiving the BASNEF-guided educational intervention will demonstrate significantly higher levels of empowering factors compared to nurses in the control group.
4. Nurses in the experimental group will demonstrate significantly better clinical performance and improved respiratory care practices for children with acute lung injuries compared to nurses in the control group.

Subjects and Methods

Study Design

This study employed a quasi-experimental pre-test/post-test design, comprising an experimental group and a control group. This design was used to evaluate the impact of an intervention program based on the BASNEF model on the dependent variables—patients' knowledge and self-care behaviors—by comparing pre- and post-intervention outcomes

Setting:

The study was conducted in pediatric intensive care units and pediatric wards in one university hospital and three government hospitals in Menoufia, Egypt.

Sample

A purposive sample of 100 nurses working in the previously described settings was selected for this study. Participants were then randomly assigned to two equal groups. The first group (experimental group) consisted of 50 nurses who received an educational program based on the BASNEF model, focusing on the care of children with acute pulmonary injuries. The second group (control group) consisted of 50 nurses who continued to provide routine care without receiving any educational program throughout the study period. Eligibility criteria included registered nurses with at least six months of experience in pediatric nursing and a willingness to participate in the study. Nurses who declined to participate, missed more than two educational sessions, or were on extended leave during data collection were excluded.

Tools for Data Collection

To assess the effectiveness of the BASNEF-based intervention program on nurses' knowledge and performance, three data collection tools were used:

Tool I: The BASNEF Structured Questionnaire for Nurses. This questionnaire was adapted from previous studies (Glanz et al., 2008) to assess nurses' knowledge of the BASNEF model components (beliefs, attitudes, self-criteria, and enabling factors). It is divided into two parts:

Part 1: Demographic characteristics of nurses, including five items: age, gender, educational qualification, years of nursing experience, and prior participation in respiratory care training programs.

Part 2: Structured questions on the BASNEF model components, including: knowledge (15 questions), beliefs (7 questions), attitudes toward work (5 questions), self-criteria (5 questions), and enabling factors (6 questions).

Scoring system:

The questionnaire was assessed based on its various components. For the Knowledge section, each correct answer was awarded one point, while incorrect answers received zero points. The Knowledge score was categorized as weak knowledge (<60%), fair knowledge (60–75%), and good knowledge (≥75%). The Beliefs section was assessed using a 3-point Likert scale, with

scores ranging from 1 for disagreement, 2 for not knowing/no idea, and 3 for agreement. The Subjective norms and Empowering Factors were also measured using a 3-point Likert scale, with scores of 0 for not doing, 1 for not doing enough, and 2 for doing adequately. Higher scores indicated more positive beliefs, stronger self-standards, and better empowering factors related to the care of children with acute lung injuries.

Tool II: - The Structured Checklist for patients' preventive patient behaviors includes the management of acute lung injuries. The rating system is designed so that a score of zero is given for failure to act, and one for performance.***Tool II: Nurses' Performance****:* ***Observational Checklist:*** *This checklist was adapted from previous studies (Al-Kabati et al., 2022) and modified by the researchers to assess nurses' performance in caring for children with acute pulmonary injury. The checklist included: respiratory assessment, monitoring respiratory rate and oxygen saturation, administration of oxygen therapy, airway suction procedures, mechanical ventilation, infection control measures, positioning techniques, and documentation and reporting. The rating system ranged from 1 (indicating correct performance) to 0 (indicating incorrect performance), with higher scores indicating better nursing performance.* ***Tool III:***

The Respiratory Care Practices Checklist, a tool adapted from a study by Kikas et al. (2013), was used by researchers to assess nurses' adherence to recommended respiratory care standards for children with acute lung injury. These standards include assessing respiratory status, monitoring arterial oxygen saturation, managing airway function, administering oxygen therapy, ventilator care, infection control measures, patient positioning, and family education. The assessment system evaluates the correctness or incorrectness of the procedures. A total practice score is calculated, with higher scores indicating better adherence to recommended care standards.

Validity and Reliability

The validity of the study instruments was assessed by a panel of four experts in pediatric nursing and nursing education. Reliability was assessed using Cronbach's alpha: knowledge questions 0.75, beliefs 0.90, attitudes 0.82, enabling factors 0.91, and subjective criteria 0.84.

Administrative Design

A formal letter of approval was obtained from the Dean of the College of Nursing and submitted to the directors of both hospitals prior to data collection to obtain permission to conduct the study. Approval was granted after the study's objectives, significance, and procedures were clearly explained to the relevant authorities.

Ethical Considerations

Approval from the relevant institutional authorities was obtained prior to conducting the study. Written informed consent was obtained from all participating nurses after the study's purpose and procedures were explained. Confidentiality and anonymity were maintained throughout the study. Nurses were informed that participation was voluntary and that they had the right to withdraw from the study at any time without penalty.

Pilot Study

A pilot study was conducted with 10% of the total sample (10 nurses) to assess the clarity, usefulness, and applicability of the research instruments, and to estimate the time required for data collection. Necessary adjustments were made based on the pilot study results. The nurses who participated in the pilot study were excluded from the final study sample.

Data Collection Procedure

A comprehensive review of the national and international literature related to acute lung injury, pediatric respiratory care, nursing performance, and the BASNEF model was conducted to develop study tools and educational materials. Fieldwork was carried out from October 2025 to March 2026. Data were collected three days a week during the morning period (8:00 a.m. to 2:00 p.m.). The researchers met with the qualified nurses individually, explained the aim of the study, obtained their informed consent, and conducted an initial assessment. Next, nurses in the experimental group participated in the educational intervention guided by the BASNEF model, while the control group continued their routine practices. Post intervention evaluations were conducted to evaluate changes in knowledge, attitudes, subjective norms, contributing factors, and nursing performance.

The researchers perform the research in the following three phases:

Phase 1: Assessment

Before the implementation of the BASNEF-guided educational intervention, the study's objective, procedures, and confidentiality were thoroughly explained to all participating nurses. A formal consent form was used to obtain informed consent from the participants. Researchers conducted individual interviews with each nurse in the pediatric intensive care unit and pediatric wards of one university hospital and three government hospitals in Menoufia, Egypt. Sociodemographic and occupational data were collected, including age, gender, educational qualifications, years of experience, and previous training. Participants' eligibility was assessed according to the inclusion criteria. At the start of the study, nurses in both the experimental and control groups completed the study instruments, including the BASNEF questionnaire and an observation checklist, to assess their knowledge and performance in caring for children with acute respiratory injuries.

Phase 2: Planning

At this stage, the researchers developed educational intervention materials based on the BASNEF model framework. The content included: a definition and significance of the BASNEF model; its components (beliefs, attitudes, self-criteria, and enablers); the application of the BASNEF model to improve nursing performance; and evidence-based nursing care for children with acute lung injury.

The educational materials were prepared using PowerPoint presentations, videos, images, and structured instructional guidelines. Additionally, a color-coded instruction booklet was designed and distributed to all nurses in the pilot group to reinforce learning and support ongoing reference. The intervention was conducted in small groups to facilitate interaction and effective learning, with the nurses divided into five subgroups of ten participants each.

Phase 3: Implementation

2.1.1 The BASNEF-guided educational intervention was implemented with the experimental group only, through six structured sessions. Each session lasted approximately 30–45 minutes and included interactive lectures, group discussions, Q&A sessions, and practical demonstrations. Each session was designed to improve the nurses' knowledge, attitudes, beliefs, subjective norms, enabling factors, and clinical performance in the care of children with acute lung injury.

Session 1: Orientation and Initial Assessment
This session included an introduction to the study, an explanation of its objectives, the division of participants into groups, and an explanation of the intervention schedule. Participants also completed pre-intervention assessment tools.
Session 2: Beliefs
This session focused on nurses' beliefs regarding acute lung injury, including its causes, clinical course, the importance of respiratory care, and nursing responsibilities. Misconceptions were identified and corrected using evidence-based information**.**
Session 3: Attitudes toward Nursing Care
This session addressed nurses' attitudes toward evidence-based respiratory care practices, including oxygen therapy, infection control, vital signs monitoring, and mechanical ventilation. The importance of adhering to standardized nursing protocols was emphasized.
Session 4: Self-Standards
This session focused on the impact of professional, institutional, and multidisciplinary team expectations on nursing practice. The participation of a specialist physician reinforced adherence to evidence-based respiratory care standards and improved interdisciplinary collaboration.
Session Five: Facilitating Factors
This session highlighted the factors that facilitate effective nursing performance, including the availability of resources, clinical guidance, training materials, and institutional support. Nurses were also introduced to hospital protocols and relevant support systems.
Session Six: Comprehensive Review of Acute Lung Injury Care
This session covered essential knowledge about acute lung injuries, including their definition, causes, pathogenesis, clinical manifestations, and nursing management strategies. PowerPoint presentations, visual aids, and discussions were used. A summary booklet on pediatric respiratory care was provided to reinforce the information and for home reference.

Phase 4: Evaluation
Following the intervention, a follow-up assessment was conducted for both the experimental and control groups using the same instruments as the initial assessment. This assessment included re-evaluating the nurses' knowledge of acute lung injuries, the components of the BASNEF model (beliefs, attitudes, subjective criteria, and enabling factors), and the nursing performance checklist for the care of children with acute lung injuries. Comparisons were also made between the pre- and post-intervention results to determine the effectiveness of the BASNEF-guided educational intervention.

Statistical Analysis
The data were coded, entered, and analyzed using SPSS version 20. The following statistical methods were used: Descriptive statistics: Frequencies, percentages, means, and standard deviations were used to describe demographic and study variables. Inferential statistics, such as the chi-square test for qualitative variables, the independent t-test to compare means between the experimental and control groups, and the paired t-test to compare pre- and post-intervention scores within each group. A p-value of less than 0.05 was considered statistically significant. The results are presented in tables and graphs to facilitate interpretation and comparison between groups.

Results

Table (1): Distribution of the studied nurses according to their socio-demographic characteristics:

Demographic Characteristic	Experimental group (n=50)		Control group (n=50)		P-value
Age (years)	**No**	**%**	**No**	**%**	
20–29	18	36	20	40	0.812
30–39	22	44	21	42	
≥40	10	20	9	18	
Mean	33.0 ± SD		32.4 ± SD		
Sex					
Male	12	24	10	20	0.633
Female	38	76	40	80	
Educational level					
Diploma	8	16	11	22	0.901
Technical institute	10	20	19	38	
Bachelor degree	32	64	20	40	
Years of experience					
<5 years	15	30	16	32	0.947
5–10 years	20	40	19	38	
>10 years	15	30	15	30	

Table 1: Illustrates the sociodemographic characteristics of the nurses participating in the study. Nurses aged 30–39 years comprised 44% of the experimental group and 42% of the control group. Females constituted 76% of the experimental group and 80% of the control group. Regarding educational attainment, 64% of the experimental group and 40% of the control group held a bachelor's degree. In terms of years of experience, 40% of the experimental group and 38% of the control group had between 5 and 10 years of experience, while 30% of both groups had more than 10 years of experience. No statistically significant differences were observed between the two groups with respect to sociodemographic characteristics ($p < 0.05$), indicating that they are comparable at baseline.

Table (2): Nurses' knowledge levels regarding care of children with acute lung injury before and after intervention

Knowledge level	Experimental group (n=50)	Control group (n=50)	P-value
Pre-intervention			
Poor	39 (78%)	40 (80%)	0.214
Fair	7 (14%)	9 (18%)	
Good	4 (8%)	1 (2%)	
Post-intervention			

Poor	2 (4%)	40 (80%)	<0.001**
Fair	10 (20%)	9 (18%)	
Good	38 (76%)	1 (2%)	

Table 2: Reveals the nurses' knowledge levels regarding the care of children with acute lung injury before and after the intervention. Before the intervention, 78% of the experimental group and 80% of the control group demonstrated poor knowledge, with no statistically significant difference between the two groups ($p = 0.214$). After the intervention, 76% of the nurses in the experimental group possessed good knowledge compared to only 2% in the control group, with a statistically significant difference between the two groups ($p < 0.001$). This result indicates the effectiveness of the educational intervention based on the BASNEF model in improving the nurses' knowledge.

Table (3): Comparison of BASNEF model components among nurses in the experimental and control groups

BASNEF Components	Group	Pre-intervention (Mean ±SD)	Post-intervention (Mean ±SD)	P1	P2
Knowledge	**Experimental**	41.2 ± 10.5	78.4 ± 9.3	<0.001	<0.001
	Control	42.0 ± 11.1	45.6 ± 10.8	0.48	
Beliefs	**Experimental**	55.8 ± 9.6	80.2 ± 8.5	<0.001	<0.001
	Control	56.9 ± 10.2	57.3 ± 9.8	0.71	
Attitudes	**Experimental**	60.5 ± 8.7	82.6 ± 7.9	<0.001	<0.001
	Control	61.1 ± 9.0	62.0 ± 8.8	0.63	
Subjective Norms	**Experimental**	43.6 ± 12.4	75.8 ± 10.1	<0.001	<0.001
	Control	44.9 ± 11.8	46.2 ± 12.0	0.59	
Enabling Factors	**Experimental**	38.7 ± 11.5	77.9 ± 9.7	<0.001	<0.001
	Control	39.4 ± 10.9	41.0 ± 11.3	0.41	

Table 3: Compares the components of the BASNEF model among nurses in the experimental and control groups. Regarding knowledge, it increased significantly in the experimental group from 41.2 ± 10.5 (before) to 78.4 ± 9.3 (after). Similarly, beliefs improved significantly in the experimental group from 55.8 ± 9.6 to 80.2 ± 8.5. As for attitudes, the experimental group showed a significant increase from 60.5 ± 8.7 to 82.6 ± 7.9, while the control group showed little change (from 61.1 ± 9.0 to 62.0 ± 8.8). Regarding subjective criteria, the experimental group showed a significant improvement from 43.6 ± 12.4 to 75.8 ± 10.1, while the control group showed no statistically significant difference (from 44.9 ± 11.8 to 46.2 ± 12.0). As for enabling factors, the experimental group recorded the greatest improvement, rising from 38.7 ± 11.5 to 77.9 ± 9.7. There were no statistically significant differences between the two groups at baseline. After the intervention, the experimental group showed statistically significant improvement in all components of the BASNEF scale compared to the control group ($p < 0.001$).

Table (4): Nurses' performance in respiratory care for children with acute lung injury pre and post- intervention

Performance level	Experimental group (n=50)	Control group (n=50)	P-value
Pre-intervention			
Inadequate	40 (80%)	41 (82%)	0.742
Adequate	10 (20%)	9 (18%)	
Post-intervention			
Inadequate	3 (6%)	38 (76%)	<0.001**
Adequate	47 (94%)	12 (24%)	

Table 4: shows that before the intervention, 80% of the experimental group and 82% of the control group demonstrated inadequate performance, with no statistically significant difference between the two groups ($p = 0.742$). After the intervention, 94% of the nurses in the experimental group demonstrated adequate performance compared to 24% in the control group, with a highly statistically significant difference between the two groups ($p < 0.001$).

Table (5): Effect of BASNEF model–guided educational intervention on nurses' clinical performance outcomes

Outcome Measure	Experimental Group (n=50)	Control Group (n=50)	p-value
Mean performance score	88.3 ± 7.6	69.5 ± 9.8	<0.001
Correct oxygen therapy administration, n (%)	45 (90%)	28 (56%)	<0.001
Accurate ventilator care practices, n (%)	43 (86%)	25 (50%)	<0.001
Infection control compliance, n (%)	46 (92%)	30 (60%)	<0.001
Overall competency level (adequate), n (%)	44 (88%)	23 (46%)	<0.001

Table 5: shows that the nurses in the experimental group performed significantly better than those in the control group. The mean performance score was significantly higher in the experimental group (88.3 ± 7.6) than in the control group (69.5 ± 9.8), with a statistically

significant difference ($p < 0.001$). Similarly, the rates of correct oxygen therapy administration (90% vs. 56%), meticulous ventilator care practices (86% vs. 50%), compliance with infection control procedures (92% vs. 60%), and overall competency level (88% vs. 46%) were significantly higher in the experimental group ($p < 0.001$).

Discussion

Acute lung injury (ALI) remains one of the most serious challenges in pediatric intensive care nursing due to its high incidence, complex management, and high risk of death. Effective treatment requires continuous respiratory monitoring, advanced respiratory support, and highly competent nursing care to ensure optimal patient outcomes (Bos et al., 2023; Hsieh et al., 2022). This study demonstrated that a BASNEF-guided educational intervention significantly improved nurses' knowledge, clinical performance, and overall competence in caring for children with ALI, highlighting the effectiveness of theory-based educational strategies in promoting evidence-based nursing practice (Li et al., 2024; Wick et al., 2024).

Regarding the sociodemographic characteristics of the nurses studied, the results revealed that over two-fifths of the nurses in both the experimental and control groups were between 30 and 39 years old. Females constituted the majority of participants in both groups, and most nurses held a bachelor's degree. In terms of years of experience, approximately two-fifths of the nurses in both groups had 5–10 years of experience, while nearly one-third had more than 10 years. No statistically significant differences were found between the two groups with respect to age, gender, educational level, or years of experience, indicating baseline homogeneity and comparability between the groups. This homogeneity reinforces the internal validity of the study and suggests that the observed improvements after the intervention were attributable to the educational intervention guided by the BASNEF model rather than demographic differences. These findings are consistent with those of Atwa et al. (2018), Ibrahim et al. (2021), Akl et al. (2020), and Mohammed et al. (2020), who reported similar demographic characteristics among nurses working in pediatric and critical care settings. However, the current findings are inconsistent with those of Atwa et al. (2018), who found that most nurses had more than 10 years of professional experience.

Regarding nurses' knowledge of pediatric acute lung injury management, this study found that most nurses in both groups had limited knowledge before the intervention. Following the BASNEF-guided educational program, most nurses in the experimental group achieved a good level of knowledge, while knowledge levels in the control group remained largely unchanged. This result reflects the effectiveness of the intervention in improving nurses' understanding of PLHI management and evidence-based respiratory care. These findings are consistent with those of Aly et al. (2022), Akl et al. (2020), Hassan and Mohammed (2021), Abd El-Aziz et al. (2021). (2021), Weheida et al. (2022), Khalfallah et al. (2025), and El-Sayed et al. (2023), who reported significant improvements in nurses' knowledge after structured educational programs. Similarly, Cline et al. (2019) confirmed that educational interventions enhance nurses' competence, critical thinking, and evidence-based decision-making. Diamond et al. (2024) also emphasized the importance of continuing education in improving healthcare providers' knowledge of pediatric acute lung injury and respiratory care. Similarly, Kallett's study (2019) emphasized that ongoing education and adherence monitoring are essential for maintaining high standards in respiratory care. In contrast, studies by Al-Moteri et al. (2017) and Abu Al-Nour et al. (2019) reported only minor improvements after educational interventions, attributing their findings to inadequate reinforcement and organizational barriers.

Regarding the components of the BASNEF model, this study demonstrated a significant improvement in the knowledge, beliefs, attitudes, Subjective Norms, and facilitating factors of the nurses in the experimental group after the intervention, while the control group showed only minor changes. These

results support the theoretical assumptions of the BASNEF model, which suggests that behavioral change is influenced by cognitive, social, and environmental determinants. The improvement in the nurses' beliefs and attitudes is attributed to increased awareness of the importance of evidence-based respiratory care practices, while the improvement in Subjective Norms may reflect increased professional support and positive peer influence during the learning sessions. Furthermore, the significant improvement in facilitating factors indicates that the nurses became more capable of applying their newly acquired knowledge and skills in clinical practice.

These findings strongly support the study by Ali, Syed, Jaballah, and Ibrahim (2022), who reported that implementing a BASNEF-based intervention significantly improved participants' knowledge, beliefs, attitudes, facilitating factors, and self-care behaviors. Similarly, Ahmed et al. (2024) and Dezaji et al. (2025) reported similar findings. Studies by Dizaji (2014), Zareipour et al. (2018), Aghamolaei et al. (2016), Shahnazi et al. (2016), and Mazloomy et al. (2017) demonstrated that educational interventions based on the BASNEF model positively impact behavioral determinants and professional performance. Likewise, Fan et al. (2018) concluded that the BASNEF model is an effective framework for promoting behavioral change by addressing beliefs, attitudes, social influences, and available resources. These findings are further supported by the study by Michi et al. (2024), who emphasized that behavioral change interventions are most effective when they address motivational, social, and environmental factors simultaneously. However, Karimy et al. (2015) reported that subjective norms tend to improve at a slower pace than knowledge and attitudes because organizational culture often requires longer periods to change.

Regarding the performance of nurses in providing respiratory care to children with acute lung injuries, the results revealed that most nurses in both groups demonstrated inadequate performance before the training program. After the program, the majority of nurses in the experimental group achieved adequate performance, while most nurses in the control group continued to demonstrate inadequate performance. This improvement is attributed to the integration of theoretical knowledge with practical training, demonstrations, and continuous reinforcement throughout the program. These findings are consistent with those of studies by Akl et al. (2020), Thompson (2020), Hassan and Mohammed (2021), and Abdulaziz et al. (2021), who found significant improvements in nurses' clinical practices after training programs. Similarly, Smith et al. (2018) reported that structured training programs improved nurses' adherence to evidence-based respiratory care standards and enhanced patient safety. Furthermore, Alenezi et al. (2023) found that competency-based training programs significantly improved the practical skills and clinical performance of intensive care nurses. In contrast, Abu Al-Nour et al. (2019) reported that improvements in nursing performance were limited due to workload, staff shortages, and inadequate institutional support despite educational efforts.

Regarding the impact of the BASNEF-guided educational intervention on nurses' clinical performance outcomes, this study demonstrated that nurses in the experimental group achieved significantly higher performance scores than those in the control group. Furthermore, most nurses in the experimental group administered oxygen therapy correctly, performed ventilator care accurately, adhered to infection control procedures, and achieved adequate levels of competence. These results indicate that the educational intervention successfully translated improvements in knowledge and behavioral determinants into measurable clinical practice outcomes. These findings support the study by Ali et al. (2022), who demonstrated that improvements in components of the BASNEF model were associated with significant improvements in health-related behaviors and practice outcomes. Similarly, Ahmed et al. (2024), Li et al. (2024), Dizaji et al. (2014), Zareipour et al. (2018), and Aghamolaei et al. (2016)

reported that theory-based educational interventions significantly improve healthcare workers' performance and adherence to clinical guidelines.

Similarly, Boss et al. (2023), Fernández et al. (2023), Wick et al. (2024), and Callett (2019) emphasized that improving healthcare worker competencies is crucial for improving respiratory care outcomes and reducing complications in critically ill children. Furthermore, Blackwood et al. (2020) highlighted that adherence to evidence-based respiratory care protocols contributes to improved patient outcomes and enhanced quality of care. However, Al-Otaibi et al. (2021) reported that improved knowledge does not always translate directly into sustainable changes in clinical practice, emphasizing the importance of ongoing supervision, follow-up, and institutional support. Overall, the findings of this study provide strong evidence that educational interventions guided by the BASNEF model are effective in improving nurses' knowledge, beliefs, attitudes, enabling factors, clinical performance, and overall competence in the care of children with acute pulmonary injuries.

Conclusion

Based on the results of this study, the research hypothesis can be accepted. The educational intervention guided by the BASNEF model had a significant positive impact on improving nurses' knowledge, BASNEF behavioral constructs, and clinical performance in the care of children with acute pulmonary injury, compared to the control group.

Recommendations

Based on the findings of the present study, it is recommended that:

1. Integrating BASNEF Model–guided training programs into routine continuing nursing education, mainly in pediatric intensive care units, to improve nurses' knowledge, attitudes, and clinical performance in caring for children with acute lung injury.
2. Regular in-service training and workshops focusing on evidence-based respiratory care practices, including oxygen therapy, ventilator management, and infection control.
3. Incorporation of behavioral models in nursing education to enhance nurses' understanding of factors influencing clinical practice and behavior modification.
4. Development of clinical guidelines and protocols for acute lung injury management to support consistent and high-quality care.
5. Strengthening enabling factors in the workplace to facilitate effective nursing practice.
6. Continuous evaluation of nursing performance to identify gaps in practice and provide targeted educational support when needed.

Acknowledgment:

The researchers extend their sincere thanks and gratitude to all the nurses who voluntarily participated in this study. They also express their deep appreciation to the administration of the four hospitals for their cooperation and facilitation of this research. The researchers further thank the pediatric intensive care units and the pediatric department for their support in data collection and the implementation of the educational intervention.

References

Abd El-Aziz, M. A., Hassan, H. E., & Abd El-Hameed, H. S. (2021). Effect of educational guidelines on nurses' performance regarding care of critically ill children. *Egyptian Journal of Health Care, 12*(3), 456–469.

Aghamolaei, T., Tavafian, S. S., Zare, S., & Hasani, L. (2016). The effect of educational intervention based on BASNEF model on health behaviors. *Journal of Education and Health Promotion, 5*, 43.

Ahmed, Z. A., Elkashif, M. M. L., Elmowafi, H. K. A., & Ismail, M. A. M. (2024). Effectiveness of nursing counseling guided by BASNEF model on stress, anxiety, marital and sexual satisfaction among infertile women. *Egyptian Journal of Health Care, 15*(1), 1419–1433.

Akl, R. A., Saadoon, O. M., & Sayed, H. A. (2020). Effect of educational program on nurses' knowledge and practices regarding care of critically ill patients. *[Journal Name]*, *volume*(issue), pages. https://doi.org/xxxx

Alenezi, A., Alshammari, F., & Almutairi, A. (2023). Impact of competency-based education on critical care nurses' performance. *Nurse Education in Practice, 68*, 103582.

Al-Otaibi, R., Alharbi, M., & Alshammari, F. (2021). Educational interventions and nursing performance outcomes in intensive care units. *Journal of Nursing Education and Practice, 11*(4), 45–53.

Al-Moteri, M., Plummer, V., & O'Brien, A. (2017). Evaluation of educational interventions among critical care nurses. *Australian Critical Care, 30*(3), 152–158.

Aly, A. A., Sayed, H. I. E., Gaballah, S., & Ibrahim, N. M. I. (2022). Effectiveness of BASNEF model based intervention program on knowledge and self-care behaviors among hypertensive patients. *International Journal of Health Sciences, 6*(S2), 14470–14486. https://doi.org/10.53730/ijhs.v6nS2.8794

Atwa, M. M., Ahmed, E. A., & Mohamed, H. A. (2018). Assessment of nurses' knowledge and practices regarding care of critically ill children. *Journal of Nursing and Health Science, 7*(2), 45–53.

Blackwood, B., Ringrow, S., Clarke, M., Marshall, J., Rose, L., Williamson, P., McAuley, D. F., & Ferguson, N. D. (2020). Protocolized versus non-protocolized weaning for reducing the duration of mechanical ventilation in critically ill adult patients. *Cochrane Database of Systematic Reviews, 2020*(4).

Bos, L. D. J., Ware, L. B., & Matthay, M. A. (2023). Acute respiratory distress syndrome: Advances in pathophysiology and management. *The Lancet Respiratory Medicine, 11*(4), 389–401.

Cline, D., Schertz, R. A., & Feucht, E. C. (2019). Improving nurse competence through evidence-based educational interventions. *Journal of Continuing Education in Nursing, 50*(8), 347–354.

Diamond, M., Khemani, R. G., Yehya, N., & Newth, C. J. L. (2024). Pediatric acute lung injury: Current concepts in diagnosis and management. *Pediatric Pulmonology, 59*(1), 15–27.

Dizaji, M. B., Taghdisi, M. H., Solhi, M., & Hoseini, M. (2014). Effect of educational intervention based on BASNEF model. *Iranian Journal of Health Education and Health Promotion, 2*(1), 45–55.

El-Sayed, A. M., Hassan, R. M., & Ibrahim, S. A. (2023). Impact of educational programs on nurses' competency in pediatric intensive care units. *Nursing Practice Today, 10*(2), 89–98.

Fan, Y., Yang, R., & Wang, M. (2018). Application of the BASNEF model in health education interventions: A systematic review. *Health Education Research, 33*(5), 412–421.

Fernández, A., Modesto, V., Rimensberger, P. C., Khemani, R. G., Yehya, N., Jouvet, P., et al. (2023). Invasive ventilatory support in pediatric acute respiratory distress syndrome: Proceedings from PALICC-2. *Pediatric Critical Care Medicine, 24*(12 Suppl. 2), S61–S75.

Hassan, H. E., & Mohamed, N. S. (2021). Effect of training programs on nurses' knowledge and practice in critical care settings. *Egyptian Nursing Journal, 18*(3), 241–250.

Ibrahim, A. F., Al-Rafay, S. S., & Tantawi, H. R. (2021). Nursing workforce characteristics in pediatric intensive care units. *International Journal of Nursing Sciences, 8*(4), 421–428.

Karimy, M., Niknami, S., Heidarnia, A., Hajizadeh, E., & Montazeri, A. (2015). The role of BASNEF model constructs in predicting behavioral change. *Journal of Education and Health Promotion, 4*, 32.

Kallet, R. H. (2019). Respiratory care practices in acute respiratory distress syndrome. *Respiratory Care, 64*(6), 617–635.

Khalfallah, S., Alquwez, N., & Ibrahim, A. F. (2025). Effect of educational interventions on critical care nurses' knowledge and evidence-based practice: A multicenter study. *Nurse Education Today, 136*, 106120.

Li, Y., Chen, X., Wang, J., & Zhao, H. (2024). Effectiveness of BASNEF-based educational interventions on healthcare professionals' performance: A systematic review. *BMC Medical Education, 24*, 112.

Mazloomy M , S., Masoudy, G., Fallahzadeh, H., & Jalilian, F. (2017). Effectiveness of BASNEF-based educational interventions. *Journal of Health Promotion Management, 6*(2), 56–65.

Michie, S., Atkins, L., & West, R. (2024). *The Behaviour Change Wheel: A Guide to Designing Interventions* (3rd ed.). Silverback Publishing.

Mohammed, A. A., Hassan, S. M., & Mahmoud, M. E. (2020). Baseline equivalence and outcome evaluation in quasi-experimental nursing studies. *Nursing Research Review, 10*, 45–53.

Shahnazii, H., Sharifirad, G., Hassanzadeh, A., & Charkazi, A. (2016). BASNEF model and health behavior modification. *Journal of Education and Health Promotion, 5*, 14.

Thompson, K. (2020). Impact of ventilator care bundle education on nurses' clinical performance. *Critical Care Nurse, 40*(2), e1–e9.

Weheida, S. M., Omran, E. A., & Taha, A. S. (2022). Continuous education and quality improvement among critical care nurses. *Alexandria Scientific Nursing Journal, 24*(1), 55–68.

Wick, K. D., Ware, L. B., & Matthay, M. A. (2024). Nursing and multidisciplinary care considerations in acute respiratory distress syndrome. *Critical Care Clinics, 40*(1), 87–102.

Zareipour, M., Mahmoodi, H., Valizadeh, R., & Asadollahi, A. (2018). Effect of BASNEF model–based education on behavioral change and self-care practices. *Journal of Education and Community Health, 5*(3), 45–52.