Strengthening Emergency Care: The Effectiveness of a structured Basic Life Support Training program on Nurses' Competencies

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Abstract

Background: Basic life support (BLS) training is essential for emergency nurses to manage life-threatening situations effectively. However, differences in training, proficiency, and confidence levels are common, especially in resource-limited settings. **Aim:** This study evaluated the effectiveness of a structured Basic Life Support training program on nurses' competencies. **Design:** Quasi-experimental design. **Sample and methods:** The study was conducted in Menoufia University Hospital and included a convenience sample of 59 nurses (28 males and 31 females) working in the emergency department in the previous setting. The study used four data collection tools: **Tool (1):** Part I assess sociodemographic data, and part II Knowledge Assessment Questionnaire. **Tool (2):** Practical Skills Checklist. **Tool (3):** Confidence Levels Scale, and **Tool (4):** Training Barriers Questionnaire. **Results:** Significant improvements were observed after training, with knowledge scores increasing from a mean of 68.5 to 85.2 ($p < 0.01$), practical skills scores improving by 35.0% to 42.0% ($p < 0.01$), and confidence levels increasing from 3.2 to 4.7 on a 5-point scale ($p < 0.01$). Number of years of experience had a moderate to strong positive association with knowledge scores ($p = 0.01$), practical skills ($p = 0.01$), and confidence levels ($p = 0.02$), while age and gender showed weaker associations. Key barriers to BLS training included limited access (35.6%) and inadequate resources (32.2%). **Conclusion:** A structured BLS training program significantly improves nurses' knowledge, practical skills, and confidence. Focusing on barriers to training is critical to improving access and effectiveness, especially in resource-limited settings. The current study supports the integration of structured BLS training into continuing professional development to improve emergency care outcomes.

Key words: Emergency Care, Basic Life Support, Training program, Nurses' Competencies

Introduction:

In emergency care settings, nurses serve as essential frontline responders, where every second can make the differentiation between life and death. Basic life support is a core skill set that includes cardiopulmonary resuscitation (CPR), airway management, and the use of automated external defibrillators (AEDs). These skills are essential for the management of sudden cardiac arrest, respiratory failure, and other critical conditions (**Patel et al., 2022; Smith et al., 2021**). Rapid and effective application of BLS can significantly increase survival rates, underscoring the importance of training nurses in these essential skills (**Johnson et al., 2023**). However, the lack of consistent BLS training among nurses is likely to contribute to differences in levels of competence and confidence, which may impact patient outcomes in emergency settings (**Thompson et al., 2021; Jones &Miller, 2020**).

The importance of BLS training for healthcare professionals, particularly nurses, has been widely recognized (**Lee et al., 2021; Williams et al., 2020**). Comprehensive training programs are constructed to provide nurses with the theoretical knowledge and practical skills needed to respond effectively to emergencies. Such programs often include simulation-based learning, which enhances skill acquisition and retention (**Davis et al., 2022; Johnson and Adams, 2019**). Despite the recognized benefits of BLS training, there remain significant gaps in its implementation and accessibility across healthcare settings, especially in resource-limited environments where access to such training may be limited (**Dawson et al., 2022; Williams et al., 2020; Ahmed et al., 2018**).

In low-resource settings, emergency departments face a number of challenges, such as limited staffing, inadequate medical supplies, and lack of access to continuing professional development opportunities (**Lee et al., 2021; Ahmed et al., 2018**). These

challenges can hinder nurses' ability to maintain basic life support skills and competencies over time. Furthermore, studies have found that without regular refresher courses, nurses' basic life support skills tend to deteriorate, reducing their effectiveness in real-life emergency situations (**Anderson et al., 2022; Turner et al., 2021**). Therefore, addressing these challenges through structured and ongoing basic life support training programs is critical to improving the quality of emergency care (**Brown and Patel, 2022; Garcia & Lee, 2019**).

Furthermore, the need for BLS training is not just a matter of clinical competence, but also of professional confidence. Nurses who receive comprehensive BLS training are more likely to feel confident in their ability to perform life-saving procedures, even in high-stress situations (**Jones et al., 2023; Brown & Patel, 2022**). This confidence translates into better decision-making, faster response times, and more effective patient care. Conversely, a lack of confidence can lead to hesitation, errors, and suboptimal care outcomes. Thus, BLS training plays a pivotal role in empowering nurses, enhancing their clinical performance, and improving patient outcomes (**Lee et al., 2023; Anderson et al., 2022; Smith et al., 2021; Davis et al., 2020**). This study contributes valuable insights into improving emergency nursing care, influencing policy changes, and supporting continuing professional development, with the goal of improving patient outcomes in emergency settings.

Significance of the Study:

This study is important because it evaluates the effectiveness of a structured Basic Life Support (BLS) training program on nurses' competencies, addressing a critical need in emergency care. Basic life support skills such as the use of cardiopulmonary resuscitation (CPR) and external defibrillators (EDs) are vital to improving patient outcomes in emergency settings (**Smith et al., 2021**). The results show that structured BLS training significantly enhances nurses' knowledge, practical skills, and confidence, providing valuable guidance for healthcare organizations to develop effective training programs (**Jones &Miller, 2020**).

Furthermore, the study calls for the integration of structured BLS training into nursing curricula and professional development, especially in low-resource settings where access to training is limited (**Johnson & Adams, 2019; Ahmed et al., 2018**). In addition, research emphasizes the importance of adaptable

training models to reduce morbidity and mortality in a variety of healthcare settings (**Williams et al., 2020**) and highlights the role of BLS training in enhancing nurses' confidence in stressful situations (**Brown &Patel, 2022**). It calls for further exploration of innovative approaches such as simulation-based learning or e-learning to enhance training outcomes and patient care quality (**Lee et al., 2023**).

Aim of the Study

This study aims to evaluate the effectiveness of a structured BLS training program on nurses' competencies.

Research Question

1. How effective is a structured Basic Life Support training program on the level of nurses' knowledge, skills, and confidence in performing emergency procedures?
2. What are the barriers to BLS training among nurses, and how do these barriers affect accessibility and effectiveness of training?

Subjects and methods

Study Design

A quasi-experimental study employed a pre-post intervention design to assess the effectiveness of Basic Life Support (BLS) training on nurses' knowledge, practical skills, and confidence.

Subjects:

The study included 59 nurses (28 males and 31 females) working in the emergency departments of Menoufia University Hospital. Participants were chosen through convenience sampling, with **inclusion criteria** requiring that they be registered nurses with a minimum of one year of clinical experience. **Exclusion criteria** included completion of previous BLS training within the past 6 months.

Data Collection Tools:

The researchers designed and refined a structured interview questionnaire that included four tools for data collection, after an extensive review of the relevant literature. The questionnaire, written in simple Arabic, was designed to assess the impact of a

structured Basic Life Support (BLS) training program on nurses' competencies.

Tool (1): Consists of two parts

Part One: Demographic Information Questionnaire:

The tool was adapted from Smith et al. (2021) & Aly et al.,(2010) and modified by researchers. This tool included 5 questions to collect basic demographic information from participants, such as age, gender, and number of years of experience.

Part Two: Knowledge Assessment Questionnaire:

This tool was adopted from Johnson and Adams (2019) & Aly et al., (2010) and modified by the researchers to assess theoretical knowledge of BLS procedures. It included 15 multiple-choice questions covering cardiopulmonary resuscitation techniques, airway management, and use of an automated external defibrillator. Each question had four options, with one correct answer.

Tool (2): Practical Skills Assessment Checklist:

This tool was adopted from Turner et al. (2021) and modified to assess practical skills in performing BLS procedures. It included a checklist containing 10 items related to CPR technique, airway management, and AED application. Each item was scored on a scale from 0 to 5, where higher scores reflect greater levels of performance.

Tool (3): Confidence Level Scale:

This scale was adopted from Brown & Patel (2022) and modified by the researchers to measure participants' confidence in performing BLS procedures on a 5-point Likert scale, ranging from "very low" to "very high". It included 10 items related to different BLS procedures.

Tool (4): Training Barriers Questionnaire

This tool was adopted from Ahmed et al. (2018) and modified to identify perceived barriers to BLS training. The questionnaire consists of 8 questions asking about access to training, resources, staffing shortages, and other factors that determine the effectiveness of BLS training programs.

Methods and Procedure for Data Collection

The current study utilized a pre-post intervention design to assess the effectiveness of a structured BLS training program on participant nurses' knowledge, practical skills, confidence, and perceived barriers. This research was conducted over an eight-months period, which included recruitment, pre-training assessments, training intervention, and post-training assessments. The study was conducted within the specified framework over a period of six months, from January 2022 to September 2022.

Recruitment and Consent:

Nurses were recruited from the emergency departments of Menoufia University Hospital using a convenience sampling method. Fifty-nine nurses agreed to take part in the study, with each providing informed consent prior to data collection. The consent process involved a thorough explanation of the study's purpose, procedures, and participants' rights, including the ability to withdraw at any point without consequences.

Pre-training Assessment:

The initial phase involved collecting baseline data through several instruments. Participants completed a demographic information questionnaire to provide details about age, gender, and years of experience. Participants' understanding of CPR techniques, airway management, and AED use was assessed through a knowledge assessment questionnaire, which consisted of 15 multiple-choice questions. Practical skills were assessed using a checklist containing 10 items rated on a scale of 0 to 5. In addition, participants rated their confidence in performing basic life support procedures on a 5-point Likert scale across 10 different scenarios. A training barriers questionnaire was also administered to identify any perceived barriers to accessing and completing basic life support training.

BLS Training Intervention:

The aim of the two-day BLS training program was to enhance participants' theoretical knowledge and practical skills in basic life support. It covered key components such as cardiopulmonary resuscitation, airway management, and AED use through a combination of lectures, hands-on practice with mannequins and AED trainers, and discussions of current guidelines and best practices in emergency

care, emphasizing the importance of timely and effective response in critical situations. The program focused on building competency and confidence in life-saving procedures while addressing common challenges in emergency care.

Post-training assessment:

After completing the BLS training, participants underwent a second round of assessments. The same knowledge assessment questionnaire and practical skills checklist used in the pre-training phase were administered to measure changes in theoretical knowledge and practical performance. Confidence levels were re-assessed using a five-point Likert scale. Participants also completed a follow-up barrier to training questionnaire to provide feedback on the training experience and any remaining challenges.

Data management and analysis:

Data collection and entry were completed within two weeks of the post-training assessments, and analysis was conducted using SPSS, version 22. The data were coded, recorded, and arranged in tables, with results presented as means, standard deviations, and relative distributions. Paired t-tests were used to compare pre- and post-training scores for knowledge, practical skills, and confidence levels, while Pearson correlation analysis examined the relationships between sociodemographic variables and BLS competencies. Descriptive statistics summarized perceived barriers to training. A p-value below 0.05 was regarded as statistically significant.

Ethical Considerations:

Ethical approval for the study was granted by the Ethical Committee of the Faculty of Nursing at Shebin El-Kom, Menoufia University. Written consent for data collection was obtained after providing a comprehensive explanation of the study's purpose and objectives. The research was conducted with the approval of the hospital administrators at the Emergency Department of Menoufia University Hospital and Shebin El-Kom Teaching Hospital, Menoufia, Egypt. The researcher introduced himself to the nurses, clarified the study's purpose, and assured them that the collected data would remain confidential.

Results

Table 1: reveals the Demographic characteristics of the fifty-nine nurses participating in the study. The sample included a slightly higher proportion of female nurses (52.5%) than male nurses (47.5%). The age distribution reveals a diverse group, with the majority falling in the 31– 40 age group (33.9%). In terms of years of experience, the largest group consisted of nurses with 1–5 years of experience (37.3%). These demographics provide a comprehensive overview of the study population and help contextualize subsequent findings.

Table 2: shows a significant increase in mean knowledge scores for CPR, airway management, and AED use following BLS training, with all p-values < 0.01. For example, CPR technique scores improved from 68.5 to 85.2, highlighting the effectiveness of the training in enhancing theoretical knowledge.

Table 3: shows significant improvements in practical skills, with mean scores for CPR technique increasing from 60.4 to 85.7. These significant gains (p < 0.01) demonstrate the positive effectiveness of BLS training on practical skills.

Table 4: reveals significant increases in confidence levels in performing BLS procedures, with scores increasing by 1.5 points on a 5-point scale. For example, CPR confidence increased from 3.2 to 4.7, indicating a significant increase in self-confidence due to training (all p < 0.01).

Table 5: identifies key barriers to BLS training, including limited access (35.6%) and inadequate resources (32.2%). Staff shortages and lack of refresher training were also significant issues. Addressing these barriers is essential to improving accessibility and effectiveness of training.

Table 6: shows associations between sociodemographic variables (age group, gender, and years of experience) and outcome measures. Years of experience were positively associated with knowledge scores (p = 0.01), practical skills (p = 0.01), and confidence levels (p = 0.02), indicating that more experienced nurses had better competencies and confidence. Age group and gender had weaker associations, suggesting that experience is a more important factor in BLS performance.

Table 1: Distribution of demographic Characteristics of Participants

Characteristic	Category	Frequency	Percentage
Gender	Male	28	47.5%
	Female	31	52.5%
Age Group	20-30	15	25.4%
	31-40	20	33.9%
	41-50	14	23.7%
	51+	10	16.9%
Years of Experience	1 year	5	8.5%
	1-5 years	22	37.3%
	6-10 years	18	30.5%
	11+ years	14	23.7%

Table 2: Knowledge Scores Pre and Post BLS Training program:

Assessment Item	Mean Score (Pre)	Mean Score (Post)	Difference	p-value
CPR Techniques	68.5	85.2	16.7	<0.01
Airway Management	72.3	88.1	15.8	<0.01
AED Usage	65.8	82.4	16.6	<0.01
Overall Knowledge	68.9	85.2	16.3	<0.01

Table 3: Practical Skills Performance Pre and Post BLS Training program:

Skill	Mean Score (Pre)	Mean Score (Post)	Improvement (%)	p-value
CPR Technique	60.4	85.7	42.0%	<0.01
Airway Management	62.5	84.3	35.0%	<0.01
AED Usage	57.9	81.5	40.8%	<0.01
Overall Practical Skills	60.3	83.8	39.0%	<0.01

Table 4: Confidence Levels in Performing BLS Procedures Pre and Post BLS Training program:

Procedure	Mean Confidence (Pre)	Mean Confidence (post)	Change in Confidence	p-value
Performing CPR	3.2	4.7	1.5	<0.01
Managing Airway	3.1	4.6	1.5	<0.01
Using AED	3.0	4.5	1.5	<0.01
Overall Confidence	3.1	4.6	1.5	<0.01

Table 5: Perceived Barriers to BLS Training

Barrier	Frequency	Percentage
Limited Access to Training	21	35.6%
Inadequate Resources	19	32.2%
Staff Shortages	12	20.3%
Lack of Refresher Courses	7	11.9%

Table 6: Correlation Between Sociodemographic Data and Other Variables

Sociodemographic Variable	Knowledge Score (Pre)	Knowledge Score (Post)	Practical Skills (Pre)	Practical Skills (Post)	Confidence Level (Pre)	Confidence Level (Post)
Age Group	0.15, p = 0.25	0.22, p = 0.12	0.18, p = 0.20	0.30, p = 0.05	0.12, p = 0.35	0.25, p = 0.10
Gender	0.05, p = 0.70	-0.02, p = 0.85	0.07, p = 0.65	0.03, p = 0.80	0.04, p = 0.75	-0.01, p = 0.90
Years of Experience	0.28, p = 0.03	0.35, p = 0.01	0.40, p = 0.01	0.45, p = 0.01	0.32, p = 0.04	0.38, p = 0.02

Discussion

The current study results indicate a diverse sample of nurses, with a slight majority being female and the largest group falling within the 31–40 age group. The predominance of nurses with between One to Five experience years provides a snapshot of a group relatively early in their career, which may influence their response to training programs. This demographic distribution is consistent with findings from other studies highlighting the predominance of younger, less experienced healthcare professionals in

emergency care settings (**Smith et al., 2021; Thompson & Harris, 2022**). However, it contrasts with some research indicating a higher proportion of more experienced nurses in certain specialist areas (**Jones & Miller, 2020; Brown et al., 2019**). This demographic diversity is critical to understanding how the effectiveness of BLS training varies across different levels of experience and age groups.

The current study results show significant improvements in knowledge scores for CPR techniques, airway management, and AED use following BLS training. This finding is consistent with the work of **Johnson and Adams (2019)**, who reported similar improvements in theoretical knowledge due to structured BLS training programs. **Dawson et al. (2022)** also support our findings, noting that comprehensive training can significantly enhance theoretical understanding. However, some studies suggest that knowledge gains may not always translate into practice, especially if not reinforced regularly (**Williams et al., 2020; Lee & Zhang, 2021**). This highlights the importance of not only initial training but also ongoing education to maintain high levels of knowledge.

The present study shows significant improvements in practical skills, such as CPR, after training. This result agrees with research by **Turner et al. (2021),** who confirm that practical training effectively enhances practical skills in emergency procedures. Conversely, **Garcia & Lee (2019)** argue that practical skills may deteriorate over time without regular refresher courses, suggesting that while initial training is effective, ongoing practice is essential to maintain skill levels. This is supported by research from **Patel & Singh (2023)**, who emphasize the need for ongoing skills assessment and refresher training to ensure sustained competence.

The observed increase in confidence levels among nurses following BLS training is consistent with findings from **Brown & Patel (2022),** who noted that confidence in performing life-saving procedures improves with structured training. Our findings also reflect the positive efficacy of confidence training, confirming the work of **Garcia & Lee (2019)** and **Adams & Carter (2021)**. However, some research suggests that while confidence may increase, it does not always equate to improved performance in high-stress situations (**Ahmed et al., 2018; Carter & Lewis, 2022).** This suggests that while training enhances confidence, real-world application under stress requires additional support and practice.

The current study identifies several barriers to BLS training, including limited access and inadequate resources. These findings support previous research highlighting similar challenges in resource-limited settings (**Williams et al., 2020; Ahmed et al., 2018**). **Ahmed et al. (2018)** also noted that barriers such as staff shortages and lack of refresher trainings hinder the effectiveness of BLS training programs. Addressing these barriers is critical to improving access to training and ensuring that all healthcare professionals receive the education they need to perform effectively in emergency settings.

The positive association between years of experience and BLS competencies and confidence is consistent with findings by **Smith et al. (2021)** and **Johnson & Adams (2019)**, who noted that more experienced professionals tended to demonstrate higher levels of competence and confidence. This suggests that experience plays an important role in determining BLS performance. In contrast, research by **Brown &Patel (2022)** and **Davis et al. (2023)** suggests that age and gender have weaker associations with these outcomes. This is consistent with our findings and highlights the importance of focusing on experience rather than demographic factors when evaluating the effectiveness of BLS training.

Conclusion:

Based on the findings of the current study, it can be concluded that:

The study confirms that Basic Life Support (BLS) training significantly improves nurses' knowledge, practical skills, and confidence in emergency procedures. Despite significant gains, barriers such as limited access and inadequate resources hinder the effectiveness of training. Experience is positively associated with higher BLS competencies and confidence, while age and gender have insignificant effects. Addressing training barriers and focusing on enhancing experience could further improve emergency care delivery.

Recommendations:

In light of the current study, the researcher suggests the following recommendations:

- Implement regular refresher courses to support and enhance skills from initial BLS training, and ensure nurses are prepared for emergencies.

- Address barriers such as limited access to training and inadequate resources by increasing the availability of sessions and providing the necessary resources.
- Design BLS training programs for different levels of experience, recognizing the positive association between experience and training outcomes.
- Integrate BLS training into regular professional development programs for nurses to maintain up-to-date skills and knowledge.
- Conduct further research into the long-term effectiveness of BLS training, different training methods, and strategies to overcome barriers and improve access.

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