ORIGINAL ARTICLE

Effectiveness of Simulation Training on Students' Confidence and Competence in Performing Basic Life Support

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Abstract

Background: Basic life support (BLS) is a critical skill for healthcare professionals. Traditional teaching approaches may not sufficiently ensure retention or practical proficiency. Simulation-based training offers a dynamic learning environment with opportunities for practice and feedback.

Objectives: This study aimed to assess the effectiveness of simulation-based BLS training in improving (1) competence and (2) confidence among undergraduate medical students.

Materials and methods: A quasi-experimental pre/posttest design was employed with two parallel groups (simulation vs traditional lecture-based instruction). Sixty undergraduate medical students were recruited and randomly assigned. Competence was assessed using an objective structured clinical examination (OSCE)-based performance checklist. Confidence was measured via a validated Likert-scale questionnaire. Pre- and post-training evaluations were conducted.

Results: Simulation-trained students demonstrated significantly higher posttest competence scores ($p < 0.05$) and reported increased confidence ($p < 0.05$) compared to the control group. Within-group comparisons also showed significant improvement from pre- to posttest in both metrics for the simulation group.

Conclusion: Simulation-based training significantly enhances students' competence and confidence in performing BLS. These findings support its integration into medical curricula to foster critical life-saving skills.

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Introduction

Basic life support (BLS) is an essential clinical competency for all healthcare professionals, forming the foundation of emergency response in cases of cardiac arrest, respiratory failure, and other life-threatening situations. Early recognition and prompt initiation of BLS significantly improve patient outcomes and survival rates. Therefore, ensuring that healthcare students are both competent and confident in performing BLS is a crucial component of medical and nursing education.

Traditionally, BLS training has relied heavily on didactic lectures and static demonstrations. While these methods can convey theoretical knowledge, they often fall short in promoting the hands-on proficiency and rapid decision-making required during real-life emergencies. In contrast, simulation-based education—particularly high-fidelity simulation—has emerged as a transformative pedagogical approach. It allows learners to engage in realistic clinical scenarios in a controlled, risk-free environment where they can repeatedly practice skills, receive immediate feedback, and reflect on their performance.[1,2]

High-fidelity simulators replicate real patient responses, providing immersive experiences that enhance psychomotor learning, critical thinking, and teamwork.[3] Studies have consistently shown that simulation-based BLS training results in better skill acquisition, greater retention over time, and improved performance under pressure when compared to traditional training modalities.[4,5] Moreover, simulation fosters a learner-centered environment that can enhance motivation, self-efficacy, and engagement.

Despite its increasing use, there remains a need for more robust evidence on the dual impact of simulation-based BLS training—specifically its effectiveness in improving both competence (objective demonstration of skills) and confidence (learner self-perception and assurance in applying those skills). This is particularly relevant for undergraduate healthcare students, who may have limited clinical exposure and require structured, experiential learning opportunities to develop readiness for emergencies.

Therefore, the present study was undertaken to evaluate the effectiveness of simulation-based training in enhancing students' competence in performing BLS and to assess the impact of simulation training on students' self-reported confidence in performing BLS.

This research tried to explore the following questions: "Does simulation-based training improve students' practical competence and increase their confidence in performing BLS?"

Materials and Methods

The study was conducted within a dedicated simulation laboratory (SMART Lab) at a tertiary teaching institute in Andhra Pradesh. It employed a quasi-experimental, pre/posttest design with two distinct groups: a simulation-intervention group and a control group.

Undergraduate medical students who have not received any prior BLS certification within the preceding 12 months and are currently in their clinical years of study were eligible and included in this study after giving informed consent. A convenience sampling method was utilized for participant recruitment. A total of 60 students were included in the study, and they were divided randomly into two groups of 30 students each group.

- *Control group*: Received traditional lecture-based BLS instruction, adhering to American Heart Association (AHA) guidelines.
- *Simulation group*: Participated in high-fidelity BLS simulation training, which included hands-on practice sessions followed by structured debriefing sessions.

Data were collected at two time points: preintervention (pretest) and postintervention (posttest).

Competence: BLS competence was objectively evaluated using an objective structured clinical examination (OSCE)

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performance checklist. The maximum achievable score on this checklist was 20, and it was developed based on established AHA guidelines.[6]

Confidence: Participants' self-reported confidence in performing BLS was assessed using a validated self-report questionnaire. This questionnaire utilized a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree) and was adapted from previously published BLS training studies.[7,8]

In the pretest phase, all enrolled participants completed the confidence questionnaire and performed a standardized BLS scenario to establish baseline competence. During the intervention phase, participants received the assigned training specific to their group (either lecture-based for the control group or simulation-based for the simulation group). Immediately following the intervention, both competence and confidence were reassessed using the same instruments and standardized BLS scenario as in the pretest.

The study was approved by the Institutional Ethics Committee. Written informed consent was obtained from all participants. Confidentiality and anonymity were maintained throughout the study. Participation was voluntary, and participants were free to withdraw at any stage without prejudice. The benefit of the intervention was also assured to be extended to the other group.

Data were analyzed using SPSS version 25.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were expressed as mean and standard deviation (SD) for continuous variables. For within-group comparisons, a paired *t*-test. Between-group differences were assessed using an independent *t*-test. A *p*-value of < 0.05 was considered statistically significant.

Results

The study was conducted with 30 students in each blinded group. Statistically significant improvements were observed in both self-reported confidence and competence following the respective interventions.

Confidence Scores

In the control group (lecture-based), the mean confidence score increased from 2.8 ± 0.5 to 3.2 ± 0.6 (mean difference: +0.4; $p = 0.00047$). The simulation-based group demonstrated a marked improvement from 2.9 ± 0.4 to 4.4 ± 0.5 (mean difference: +1.5; $p < 0.000000000003$). Between-group comparison of posttest confidence scores revealed a statistically significant difference favoring the simulation group (4.4 ± 0.5 vs 3.2 ± 0.6; mean difference: +1.2; $p < 0.000000001$), highlighting the superior effect of simulation-based training in enhancing learner confidence (Table 1).

Competence Scores

Both groups also demonstrated gains in posttest assessment scores, although the improvement was more substantial in the simulation group. The control group improved from 10.2 ± 1.9 to 12.1 ± 2.0 (mean difference: + 1.9; $p = 0.08$), which was not statistically significant. In contrast, the simulation group showed a significant increase from 10.1 ± 2.0 to 16.3 ± 1.7 (mean difference: + 6.2; $p < 0.001$). Between-group comparison of posttest scores further demonstrated a significant advantage in favor of the simulation group (16.3 ± 1.7 vs 12.1 ± 2.0; mean difference: + 4.2; $p < 0.001$) (Table 2).

These findings affirm that simulation-based training is a highly effective pedagogical approach for enhancing both clinical confidence and competence in BLS among undergraduate medical students. The structured, immersive nature of simulation—characterized by repetitive hands-on practice, real-time feedback, and experiential learning—contributed to significantly higher postintervention OSCE scores, reinforcing its utility in preparing learners for high-stakes emergencies.

Discussion

The findings of the present study are in alignment with previously published literature,[1,4,5] reinforcing the efficacy of high-fidelity simulation in enhancing both psychomotor performance and learner self-confidence in BLS training. Unlike traditional didactic methods, simulation allows learners to engage in active, hands-on practice within a safe and controlled environment that closely mimics real-life clinical scenarios. This experiential learning approach not only facilitates the acquisition of technical skills but also improves decision-making under pressure, a critical component in emergency response.

Aqel and Ahmad[7] reported significant improvement in CPR performance and confidence levels among nursing students following simulation-based instruction, while Roh et al.[8] similarly observed superior outcomes in knowledge retention, procedural accuracy, and team communication. These findings collectively underscore

Table 1: Comparison of confidence scores

Group	*Pretest confidence*	*Posttest confidence*	*Mean difference*	*p-value*
Control (lecture)	2.8 ± 0.5	3.2 ± 0.6	+ 0.4	0.00047
Simulation-based	2.9 ± 0.4	4.4 ± 0.5	+ 1.5	< 0.000000000003
Between groups	–	Sim: 4.4 ± 0.5 Ctrl: 3.2 ± 0.6	+ 1.2	< 0.000000001

Ctrl, control group; Sim, simulation group

Table 2: Comparison of competence scores

Group	*Assessment*	*Mean score ± SD*	*Mean difference*	*p-value*
Control	Pretest	10.2 ± 1.9	+ 1.9	0.08
	Posttest	12.1 ± 2.0		
Simulation	Pretest	10.1 ± 2.0	+ 6.2	< 0.001
	Posttest	16.3 ± 1.7		
Between groups	Posttest	Sim: 16.3 ± 1.7 Ctrl: 12.1 ± 2.0	+ 4.2	< 0.001

Ctrl, control group; Sim, simulation group

the value of simulation as an instructional strategy that addresses both cognitive and affective learning domains, which are often inadequately targeted in conventional lecture-based formats.

Moreover, simulation allows for repeated practice, immediate feedback, and structured debriefing, all of which are essential for the reinforcement of skills and correction of errors. Given the time-sensitive and high-stakes nature of BLS, such immersive training modalities are particularly relevant for equipping students with the competence and confidence necessary to perform effectively during actual resuscitation events. Therefore, the integration of high-fidelity simulation into medical and nursing curricula should be viewed not merely as an enhancement but as an essential component of BLS training.

Conclusion

Simulation-based BLS training was found to significantly enhance both confidence and competence among students. These findings support its wider incorporation into health professional curricula to improve preparedness for life-saving interventions.

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