A Study To Assess The Effectiveness Simulation-Based Cardiopulmonary Resuscitation With Advance Airway Management Among Nursing Students A Quasi-Experimental Study

PRASIDH NARAYAN PATHAK, SAHIL SRIVASTAVA,NEHA SINGH

Abstract

Background: Early mastery of Cardio Pulmonary Resuscitation is crucial in nursing education. Innovative strategies like flipped-classroom, simulation, and OSCE are gaining traction, but their effectiveness in entry-level Nursing Students is underexplored.

Objective: To evaluate the impact of a flipped-classroom BLS module integrated with OSCE and simulation on knowledge and competency among Nursing students.

Methods: A quasi-experimental one-group pretest–posttest study was conducted with 43 students. The intervention included pre-class microlearning resources, in-class OSCE stations, and team-based simulation scenarios. Outcomes included knowledge (15-item MCQ), OSCE performance, and learner feedback. Paired t-tests and Cohen's dz quantified effects.

Results: Mean knowledge scores improved from 7.83±2.64 to 12.69±2.31 ($p<0.001$), with a very large effect size ($dz=2.31$). Achievement of ≥80% increased from 2.9% to 74.3%, and perfect scores rose from 0% to 25.7%. Most items showed significant improvement, particularly in AED use, chain of survival, and recognition of arrest.

Conclusion: Flipped-classroom BLS training combined with OSCE and simulation is highly effective in novice nursing education. Integration into curricula is recommended.

Introduction

Cardio Pulmonary Resuscitation (CPR) is a fundamental lifesaving competency for all healthcare professionals. In nursing education, early training in Cardio pulmonary Resuscitation is essential for patient safety and clinical preparedness. Traditional didactic methods often emphasize knowledge transfer but do not adequately ensure psychomotor skills or decision-making readiness.

Innovative educational methods such as flipped-classroom learning, simulation, and OSCE have been introduced to improve engagement and competency. The flipped-classroom model shifts knowledge acquisition to pre-class activities, allowing classroom time to focus on practice and higher-order thinking. Simulation provides experiential learning in safe environments, while OSCE ensures standardized assessment. Although effective in advanced life support training, evidence in entry-level nursing programs—particularly Nursing Students in India—remains limited. This study evaluates the effectiveness of a flipped-classroom BLS training module with OSCE and simulation scenarios among first-year Nursing students.

Review of Literature

Flipped-Classroom in Medical/Nursing Education: Chen et al. (2017) conducted a systematic review demonstrating that flipped-classroom models enhance engagement and performance. O'Flaherty & Phillips (2015) found consistent benefits across higher education. Beom et al. (2021) specifically applied flipped-classroom to ACLS and reported superior outcomes compared to lectures.

Simulation in Nursing & Resuscitation: Motola et al. (2013) highlighted simulation as a best-practice method for psychomotor and teamwork training. Yoo et al. (2012) showed improved ACLS retention with simulation. King (2009) reported simulation superior to traditional ACLS teaching.

OSCE as Assessment Tool: Harden (1975) introduced OSCE as an objective, structured assessment format. Al-Ghareeb et al. (2019) confirmed OSCE's role in enhancing competence in nursing education.

Gap: Few studies combine flipped-classroom, simulation, and OSCE for BLS at the GNM level in India. This study addresses that gap.

Methods

Design: Quasi-experimental, one-group pretest–posttest.

Participants: 43 first-year Nursing students (convenience sampling).

Intervention: Three phases – (1) pre-class microlearning (videos/readings), (2) in-class OSCE skill stations with checklists on advanced airway, (3) simulation of cardiac arrest scenarios with debriefing.

Outcomes: Knowledge (15-item MCQ), OSCE performance, learner feedback.

Analysis: Descriptive statistics, paired t-test, Cohen's dz, item-level analysis, achievement thresholds.

Results

Knowledge improved from 7.83±2.64 to 12.69±2.31 (mean gain 4.86±2.10), $t(42) = 13.67$, $p < 0.001$, Cohen's $dz = 2.31$. ≥80% achievement increased from 2.9% to 74.3%; perfect scores rose from 0% to 25.7%. Item-level analysis showed greatest improvements in AED steps, chain of survival, and recognition of arrest.

Table 1. Achievement Thresholds

Threshold	Pre (%)	Post (%)	Change
>=9	40.0%	91.4%	51.4%
>=12	2.9%	74.3%	71.4%
>=13	2.9%	62.9%	60.0%
>=15	0.0%	25.7%	25.7%

Table 2. Item-Level Correctness

Item	Pre Mean	Post Mean	Gain
1.0	0.54	1.00	0.46
2.0	0.89	1.00	0.11
3.0	0.60	0.94	0.34
4.0	0.40	0.86	0.46
5.0	0.26	0.74	0.49
6.0	0.60	0.89	0.29
7.0	0.57	0.89	0.31
8.0	0.46	0.51	0.06
9.0	0.91	0.91	0.00
10.0	0.40	0.94	0.54

11.0	0.23	0.77	0.54
12.0	0.54	0.89	0.34
13.0	0.57	0.83	0.26
14.0	0.71	0.86	0.14
15.0	0.14	0.66	0.51

Figure 1. Paired Pre vs Post Scores

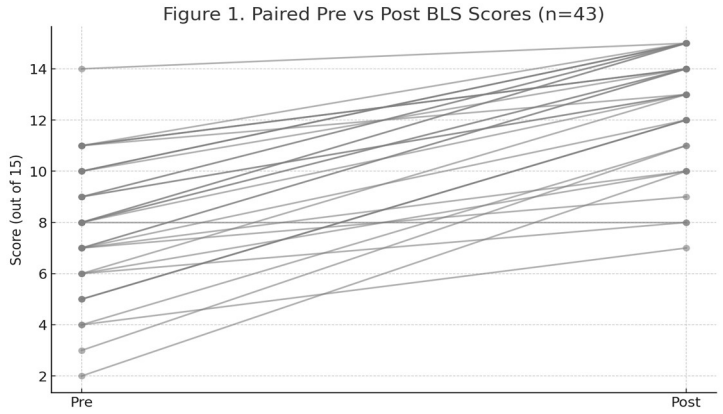


Figure 2. Distribution of Score Gains

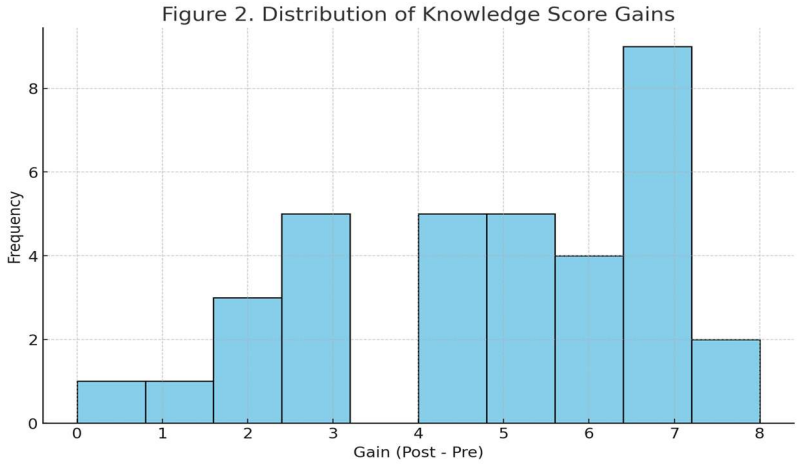
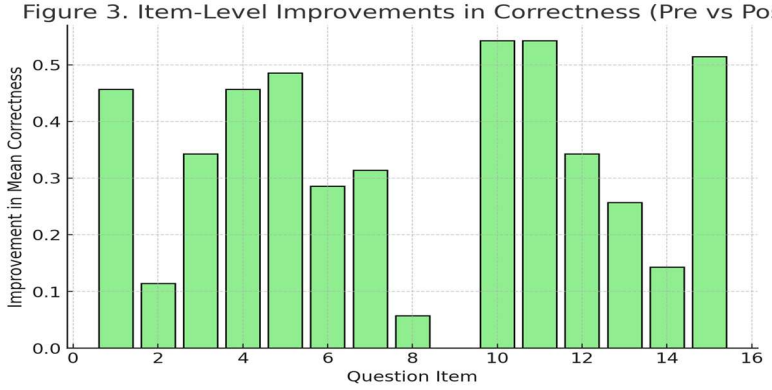


Figure 3. Item-Level Improvements

Figure 3. Item-Level Improvements in Correctness (Pre vs Post)



Discussion

This study confirms that flipped-classroom CPR training with OSCE and simulation produced a significant and meaningful improvement in knowledge. The effect size (dz=2.31) is exceptionally large, far exceeding the threshold for educational interventions. Results align with Beom et al. (2021), Yoo et al. (2012), and King (2009), all of whom reported simulation-based approaches outperform traditional lectures. OSCE ensured objective assessment, consistent with Harden's framework. The high post-test mastery (>80%) highlights the approach's potential for curriculum adoption. **Limitations:** single-group design, lack of retention data, and single institutional setting. Future research should use randomized controlled trials and evaluate long-term skill retention.

Conclusion

Flipped-classroom CPR training with OSCE and simulation significantly enhanced knowledge, competency, and confidence among GNM first-year students. The method is highly effective and should be integrated into nursing curricula to strengthen patient safety and early clinical readiness.

References

American Heart Association. (2020). 2020 AHA Guidelines for CPR and ECC. Circulation, 142(16_suppl_2), S337–S357.

Beom, J. H., Kim, J. H., Chung, H. S., Kim, S. M., Ko, D. R., & Cho, J. (2021). Flipped-classroom training in advanced cardiopulmonary life support. PLOS ONE, 16(1), e0246120.

Yoo, H. B., Park, J. H., & Ko, J. K. (2012). An effective method of teaching ACLS skills in simulation-based training. Korean Journal of Medical Education, 24(1), 7–14.

King, J. (2009). The effectiveness of traditional versus simulation ACLS teaching methods. Clinical Simulation in Nursing, 5(3), e105–e111.

Chen, F., Lui, A. M., & Martinelli, S. M. (2017). A systematic review of the effectiveness of flipped classrooms in medical education. Medical Education, 51(6), 585–597.

O'Flaherty, J., & Phillips, C. (2015). The use of flipped classrooms in higher education: A scoping review. Internet and Higher Education, 25, 85–95.

Motola, I., Devine, L. A., Chung, H. S., Sullivan, J. E., & Issenberg, S. B. (2013). Simulation in healthcare education: A best evidence practical guide. Medical Teacher, 35(10), e1511–e1530.

Harden, R. M., Stevenson, M., Downie, W. W., & Wilson, G. M. (1975). Assessment of clinical competence using objective structured examination. British Medical Journal, 1(5955), 447–451.

Al-Ghareeb, A. Z., Cooper, S. J., & McKenna, L. (2019). The use of OSCE in nursing education: An integrative review. Nurse Education Today, 79, 104–113.