Family Medicine and Primary Care: Open Access
Srivastava J, et al. J Family Med Prim Care Open Acc 8: 266.
www.doi.org/10.29011/2688-7460.100266
www.gavinpublishers.com

Research Article

Impact of B.L.S Simulation on Knowledge Acquisition, Knowledge Retention, Self-Efficacy among Non-Medical Students Studying in United University, Prayagraj

Jyoti Srivastava[1*], Jyoti Rani[2], Prasann Roy[3], Akash Bansirar[4], Anchal Gupta[5]

[1]Assistant Professor, Faculty of Nursing, United University, Prayagraj, Uttar Pradesh, India

[2]Nursing Officer, AIIMS Raebareli, Raebareli, Uttar Pradesh, India

[3]Assistant Professor, Faculty of Nursing, United University, Prayagraj, Uttar Pradesh, India

[4]Assistant Professor, Faculty of Nursing, United University, Prayagraj, Uttar Pradesh, India

[5]Demonstrator, Faculty of Nursing, Uttar Pradesh University of Medical Sciences, Saifai, Etawah, Uttar Pradesh, India

[*]**Corresponding author:** Jyoti Srivastava, Assistant Professor, Faculty of Nursing, United University, Prayagraj, Uttar Pradesh, India

Citation: Srivastava J, Rani J, Roy P, Bansirar A, Gupta A (2024) Impact of B.L.S Simulation on Knowledge Acquisition, Knowledge Retention, Self-Efficacy among Non-Medical Students Studying in United University, Prayagraj. J Family Med Prim Care Open Acc 8: 266. DOI: 10.29011/2688-7460.100266

Received Date: 24 July, 2024; **Accepted Date:** 31 July, 2024; **Published Date:** 05 August, 2024

Abstract

Background: Basic Life Support is a combination of several steps which is performed in an emergency such as cardiac arrest, can save life of a person. Emergency must be dealt promptly so that's why non-medical person can be handy if they have significant knowledge and practice to perform Basic Life Support. We aimed at examining the impact of B.L.S simulation (HFS) on knowledge acquisition, Knowledge retention, and Self-Efficacy among non-medical students in the view that students can help to decrease mortality rate due to OHCA. Materials and **Methods:** In this quasi-experimental study, 60 participants were selected using simple random sampling and were allocated to their respective groups randomly i.e., experimental group and control group, where participants of experimental group received HFS BLS simulation training for one week, 4 hours per day with a study material and control group did not receive any treatment. The responses of two groups were analyzed using unpaired t-test. **Results:** Parametric unpaired t test was used to test the significance of observed difference in mean knowledge acquisition after high fidelity Basic Life Support (BLS) simulation. On applying the test highly significant difference ($P<0.01$) was found in mean knowledge acquisition after high fidelity Basic Life Support (BLS) simulation. **Conclusion:** High Fidelity Simulation (HFS) is a good method to enhance knowledge acquisition, retention, and self-efficacy not only in medical professionalists but in non-medical professionalists as well.

Keywords: High Fidelity Simulation (HFS); Basic Life Support (BLS); Non-medical; Knowledge; Medical; Emergency; Cardiopulmonary Resuscitation (CPR); EMS (Emergency Medical Services)

Introduction

BLS refers to the type of emergency care offered by a first aid practitioner or other health care professional to a person experiencing cardiac arrest [1]. BLS includes CPR (cardiopulmonary

resuscitation), an emergency lifesaving operation that, when done on a patient suffering from cardiac arrest, enhances the patient's chances of survival by two or threefold [2]. Cardiac arrest is a leading cause of death in the United States, accounting for hundreds of thousands of deaths annually. According to the American Heart Association (AHA), approximately 356,000 out-of-hospital cardiac arrests occur in the U.S. each year. Of these cases, only about 10% survive to hospital discharge [3]. OHCA is the biggest cause of death in India. Patients who have cardiac arrest outside of the hospital experience, a survival probability of less than 10% of all cardiac arrest deaths [4]. India does not have an established emergency medical system. There are just 100 ambulances in each state, which means that one ambulance is accessible for every 30,000 people. Patients suffering from cardiac arrest outside of the medical facility experience delays because of this exchange, and the absence of trained professionals to perform BLS during the golden minutes lowers their chances of survival [5-7]. Efforts to improve outcomes from cardiac arrest include initiatives to enhance public awareness of CPR, increase access to Automated External Defibrillators (AEDs) in public places, strengthen emergency medical services, and advance research into novel resuscitation techniques and therapies. These efforts aim to reduce the global burden of cardiac arrest and improve survival rates for those affected by this life-threatening condition. Many studies have shown that having first responders on hand improves the chances of survival in people suffering from cardiac arrest. A layperson can be an effective first responder if they are properly trained [8]. Traditionally CPR only taught to medical professionals, its relevance extends far beyond the healthcare sector. In recent years, there has been a growing recognition of the importance of disseminating B.L.S training to non-medical individuals, empowering them to respond effectively to emergencies in various settings.

The aim of the study is to examine the effect of high-fidelity Basic Life Support (BLS) simulation on knowledge acquisition, knowledge retention, and self-efficacy.

Objectives of the study were:

1. To assess the knowledge acquisition before high fidelity basic life support (BLS) simulation

2. To assess the knowledge retention before high fidelity basic life support (BLS) simulation

3. To assess the self-efficacy before high fidelity basic life support (BLS) simulation

Hypothesis for the study were:

1. H01- there will be no significant difference between pre and post-test of knowledge acquisition after BLS Simulation

2. H02- there will be no significant difference between pre and post-test of knowledge retention after BLS Simulation

3. H03- there will be no significant difference between pre and post-test of self-efficacy in performing BLS skills after BLS Simulation

Materials and Methods

Study Design and Setting

A quasi-experimental study among non-medical students at united university, Prayagraj, Uttar Pradesh, India.

Sampling technique

A total 60 adult subjects in baccalaureate program of all courses (both male and females) participants were recruited from August 2023 to December 2023.

Sample size calculation

The sample size was estimated based on a single proportion design. The target population from which we randomly selected our sample was considered 300. With confidence interval of 10% and confidence level of 95%. The sample size calculated is 64 participants for each group with 5 % drop out.

Subjects & selection method

The study population was drawn from simple random sampling and assigned to their respective groups randomly.

The groups were as follows:

- Group I [Control Group] (n=30 participants) -No intervention was administered

- Group II [Experimental Group] (n=30 participants) – BLS simulation was given for one week, 4 hours per day (28 Hours a week) with a study material

Inclusion criteria and exclusion criteria:

We have included Students studying in under graduation program in united university. Either sex who are more than 18 years of age, able to understand English, willingness to participate. Excluding physically challenged and pregnant women.

Data Collection tools and Procedure

Following written informed consent, a well-designed self-structured questionnaire was used to collect data from the enrolled participants. The questionnaire was created in response to the objectives that needed to be assessed. It includes demographic factors such as age, gender, qualification, marital status, place of residence, awareness of BLS (Basic Life Support) and self-efficacy in providing BLS. The study recruited a sample of 30 non-medical students from diverse academic backgrounds. This set of 30 participants was further broken into five groups, with different trained persons assigned to each group to teach the same material. Participants will undergo a structured B.L.S simulation training program, which includes both theoretical instruction and hands-on practice using simulation manikins. Pre-training, post-training, and follow-up assessments will be conducted to evaluate participants' knowledge of B.L.S concepts, their ability to perform B.L.S techniques, and their self-efficacy in emergency situations.

Ethical Considerations

The authors have diligently adhered to ethical considerations, encompassing areas such as plagiarism, ensuring informed consent, avoiding misconduct like data fabrication or falsification, refraining from double publication or submission, and eliminating redundancy in their work.

Data Analysis

Quantitative data was analyzed with SPSS version 20, using statistical methods to assess changes in knowledge scores and self-efficacy ratings pre- and post-intervention. The unpaired t-test was employed to figure out the significance of differences between mean values of two continuous variables, which was then validated by the nonparametric chi square test. A parametric unpaired t test was utilized to determine the significance of the observed difference in mean knowledge acquisition prior to high fidelity basic life support (BLS) simulation. After administering the exam, there was not a substantial disparity in mean knowledge acquisition before high fidelity basic life support (BLS) simulation.

Results

The analysis of objective 1 i.e. To assess the knowledge acquisition before high fidelity basic life support (BLS) simulation. From the results we can interpret that H01 is accepted.

Knowledge Scores: Both groups had a similar range and median scores. The mean scores were slightly higher in the control group (6.17) compared to the experiment group (5.67), but this difference was not statistically significant (P>0.05).

Knowledge acquisition before high fidelity basic life support (BLS) simulation									
Study group	**Max score**	**Min-Max**	**Median**	**Mean**	**Mean%**	**SD**	**Unpaired 't' value**	**Critical value(df=58)**	**Inference**
Control Group	20	2-10	6.5	6.17	30.85	2.35	0.79	2.00	P>0.05 NS
Experiment Group	20	2-11	6	5.67	28.35	2.58			

Parametric unpaired t test was used to test the significance of observed difference in mean knowledge acquisition before high fidelity basic life support (BLS) simulation. On applying the test insignificant difference was found in mean knowledge acquisition before high fidelity basic life support (BLS) simulation.

Knowledge Categories: Most participants in both groups scored in the „Poor" category (0-8), with a higher percentage in the experiment group (90%) compared to the control group (83.33%). A small proportion scored in the „Average" category (9-12), and no participants scored in the „Good" category (13-20) in either group. This suggests that the initial knowledge levels of participants before the high fidelity BLS simulation were generally low and similar between the control and experiment groups. The lack of statistically significant difference indicates that both groups started with comparable knowledge levels. The study found that the initial knowledge levels of participants before the high fidelity BLS simulation were generally low in both the Control and Experiment groups. The scores were predominantly in the Poor category, with no significant difference between the two groups. This suggests that both groups started with a similar, relatively low level of knowledge before the BLS training.

knowledge acquisition before high fidelity basic life support (BLS) simulation				
Study group	**Poor (0-8)**	**Average (9-12)**	**Good (13-20)**	**Total**
Control Group	25(83.33%)	5(16.67%)	0(0%)	30(100%)
Experiment Group	27(90%)	3(10%)	0(0%)	30(100%)

Chi square value=0.57 [P>0.05 NS]

Non parametric chi square test was used to find the significance of difference in distribution of study subjects according to knowledge before* high fidelity basic life support (BLS) simulation *acquisition level in control and experimental group. On applying the test, the difference was found insignificant p>0.05. In control group 30%,70% were in poor and average level whereas in experimental group 46.67%,50%,3.33% were in poor, average and good knowledge level. But this difference was found insignificant.

The analysis of objective 2 i.e. To assess the knowledge retention after high fidelity basic life support (BLS) simulation. According to the results H02 is rejected.

Key Findings

Knowledge Scores After Simulation

Participants were divided into two groups: Control Group and Experiment Group. Here are their results: Control Group: Scores: Participants scored between 4 and 18 out of 20. Median Score: The middle score was 10. Mean Score: The average score was 10.9, which is 54.5% of the total possible score. Standard Deviation (SD): The variation in scores was 3.54. Statistical Significance: The comparison between groups showed a ‚t' value of 3.26, which is higher than the critical value of 2.66, indicating a highly significant difference (P<0.01).

Experiment Group: Scores: Participants scored between 8 and 18 out of 20. Median Score: The middle score was 13.5. Mean Score: The average score was 13.67, which is 68.35% of the total possible score. Standard Deviation (SD): The variation in scores was 3.02.

knowledge acquisition after high fidelity basic life support (BLS) simulation									
Study group	**Max score**	**Min-Max**	**Median**	**Mean**	**Mean%**	**SD**	**Unpaired 't' value**	**Critical value(df=58)**	**Inference**
Control Group	20	4-18	10	10.9	54.5	3.54	3.26	2.66	P<0.01 HS
Experiment Group	20	8-18	13.5	13.67	68.35	3.02			

Parametric unpaired t test was used to test the significance of observed difference in mean knowledge acquisition after high fidelity basic life support (BLS) simulation. On applying the test highly significant difference (P<0.01) was found in mean knowledge acquisition after high fidelity basic life support (BLS) simulation.

This Means that the Experiment Group scored higher on average than the Control Group. The scores in the Experiment Group were more tightly clustered around the higher mean score compared to the Control Group.

Knowledge Categories After Simulation

Participants were also categorized based on their scores into three groups: Poor (0-8), Average (9-12), and Good (13-20). Control Group: Poor (0-8): 26.67% of participants. Average (9-12): 36.67% of participants. Good (13-20): 36.67% of participants. Experiment Group: Poor (0-8): Only 3.33% of participants. Average (9-12): 40% of participants. Good (13-20): 56.67% of participants.

This Means that in the Experiment Group, very few participants (3.33%) scored in the Poor category, compared to the Control Group (26.67%). More participants in the Experiment Group scored in the Good category (56.67%) compared to the Control Group (36.67%).

Knowledge Acquisition After High Fidelity Basic Life Support (BLS) Simulation (Table no: 4)				
Study Group	**Poor (0-8)**	**Average (9-12)**	**Good (13-20)**	**Total**
Control Group	8(26.67%)	11(36.67%)	11(36.67%)	30(100%)
Experiment Group	1(3.33%)	12(40%)	17(56.67%)	30(100%)

Chi square value=6.77 P<0.05 S

Non parametric chi square test was used to find the significance of difference in distribution of study subjects according to knowledge acquisition level* after high fidelity basic life support (BLS) simulation *in control and experimental group. On applying the test, the difference in distribution was found significant p<0.05. In control group 10%,33.33%, 53.33% and 3.33% were in excellent, good, average and poor level whereas in experimental group 33.33%,46.67%,20% were in excellent, good, average knowledge level and this difference was found significant.

The study concludes that there is Higher Knowledge Retention: The Experiment Group showed significantly better knowledge retention after the BLS simulation compared to the Control Group. Statistical Significance: The differences in scores between the groups are highly significant (P<0.01), meaning the improvements in the Experiment Group are not due to chance. Improved Performance: Participants in the Experiment Group performed better overall, with higher scores and more participants reaching the Good category.

This suggests that the high fidelity BLS simulation was more effective in improving knowledge retention in the Experiment Group than in the Control Group.

The analysis of objective 3 i.e. To assess the self-efficacy before high fidelity basic life support (BLS) simulation. According to the results H03 is rejected.

Before the simulation, participants were categorized based on their self-efficacy into three groups: Low Self-Esteem, Neutral, and High Self-Esteem. Findings were: In the Control Group: Low Self-Esteem: 16 participants (53.33%), Neutral: 11 participants (36.67%), High Self-Esteem: 3 participants (10%) and in the Experiment Group: Low Self-Esteem: 22 participants (73.33%), Neutral: 8 participants (26.67%), High Self-Esteem: 0 participants (0%). This Means that in the Control Group, a little over half of the participants had low self-esteem, while a significant number were neutral, and a small percentage had high self-esteem and in the Experiment Group, a larger majority had low self-esteem, and none had high self-esteem.

Self-efficacy before high fidelity basic life support (BLS) simulation				
Study group	**Low self esteem**	**Neutral**	**High Self esteem**	**Total**
Control	16(53.33%)	11(36.67%)	3(10%)	30(100%)
Experiment	22(73.33%)	8(26.67%)	0(0%)	30(100%)

Chi square value=4.42 df=2 P>0.05 NS

Insignificant difference found in self-efficacy before high fidelity basic life support (BLS) simulation between both study groups.

After the simulation, participants were again categorized into the same three groups. Findings were in Control Group: Low Self-Esteem: 17 participants (56.67%), Neutral: 13 participants (43.33%), High Self-Esteem: 0 participants (0%) and in Experiment Group: Low Self-Esteem: 9 participants (30%), Neutral: 12 participants (40%), High Self-Esteem: 9 participants (30%). This Means that in the Control Group, the percentage of participants with low self-esteem slightly increased, with none achieving high self-esteem and in the Experiment Group, the number of participants with low self-esteem significantly decreased, and a substantial number of participants reached high self-esteem.

Self-efficacy after high fidelity basic life support (BLS) simulation (Table no: 10)				
Study group	**Low self esteem**	**Neutral**	**High Self esteem**	**Total**
Control	17(56.67%)	13(43.33%)	0(0%)	30(100%)
Experiment	9(30%)	12(40%)	9(30%)	30(100%)

Chi square value=11.50 df=2 P<0.01 HS

Highly significant difference found in self-efficacy after high fidelity basic life support (BLS) simulation between both study group.

The study Concludes that in the Control Group: The BLS simulation had little to no positive effect on self-efficacy. In fact, the percentage of participants with low self-esteem slightly increased and in the Experiment Group: The BLS simulation had a significant positive impact on self-efficacy. There was a substantial decrease in participants with low self-esteem and a notable increase in those with high self-esteem.

The high fidelity BLS simulation was effective in improving self-efficacy, especially for the Experiment Group. Participants who started with lower self-esteem showed marked improvements, with many reaching high self-esteem after the simulation. This indicates that high fidelity simulations can be a powerful tool in boosting confidence and perceived ability to perform BLS.

Discussion

Basic Life Support (BLS) is a crucial life-saving procedure for the patients suffering from cardiac arrest or Sudden cardiac death syndrome. Knowledge and practice of providing effective chest compression and rescue breaths in immediate situation of need can save thousands of lives.

Various researches have been conducted on the addressed problem. But targeting till now none of the researches has been done among students of discipline other than Medical, Paramedical or Nursing. Despite the proven benefits of BLS in patients with cardiac arrest or SCDS we fail to achieve goals.

We have heterogenous group of students studying in different institutions, coming from different background and different states as well. With definite knowledge and practice students can become the ultimate life saver.

Currently no Indian study is available for the same among school students or college students other than Medical & Nursing Schools.

The present study was a quasi-experimental done at United University, Rawatpur, Jhalwa, Prayagraj, Uttar Pradesh in the time interval of August 2022 to March 2023.

In the present study, the results showed that there is an increase in knowledge acquisition and retention for both the experimental and the control group and the unpaired t test results of knowledge acquisition on BLS mean differences between the experimental (M=13.67) and the control group (M=10.9) revealed that there was significant difference (P<0.01 HS). Therefore, the null hypothesis was rejected (H01). The results of the unpaired t test showed that there was significant difference on BLS knowledge retention (after 1 month) between the experimental and the control group. The null hypothesis was rejected (H02). When, the unpaired t test applied for self-efficacy in performing BLS showed significant difference between the experimental and the control group. The null hypothesis was rejected (H03). On assessment the Knowledge acquisition, knowledge retention and self-efficacy found not significantly associated with demographic variables (H04).

These results are consistent with the study reported by Selmin Kose, Semiha Akin, Onur Mendi & Sonay Goktas conducted the similar study on among nursing students and reported the significant improvement in knowledge and skills related to BLS but not Self-efficacy [8].

These findings are also consistent with the study conducted by Laila M. Akhu-Zaheya, Muntaha K. Gharaibeh & Ziad M. Alostaz where they reported significant statistical difference in pre and post-test among experimental group of nursing students however, they reported no significant difference in knowledge acquisition and knowledge retention of BLS among experimental group of the same [9].

Implications

Because of a death of standbyers in India, the rate of cardiac arrest death rises year after year. This study‘s findings can be used to students without medical backgrounds in preparing them to be useful during an emergency.

Conclusion

The study aimed to investigate the impact of high-fidelity Basic Life Support (BLS) simulation on knowledge acquisition and self-efficacy among non-medical students, comparing control and experimental groups. Before the simulation, significant associations were found between age and self-efficacy levels in the control group, with younger participants demonstrating varying levels of self-esteem. However, no other demographic factors significantly influenced knowledge acquisition or self-efficacy levels before the simulation in either group. After the simulation, no significant associations were observed between demographic factors and knowledge retention or self-efficacy levels in either group. These findings suggest that high fidelity BLS simulation can effectively enhance knowledge acquisition and self-efficacy regardless of demographic characteristics. However, future research may explore additional factors that could influence learning outcomes in BLS training programs.

Acknowledgements

The authors sincerely thank the study participants for giving their valuable responses to this study.

Financial support and sponsorship: Nil.\

Conflicts of Interest

The authors declared no potential conflicts of interest concerning the research, authorship, and/or publication of this article.

Statements and Declarations

The authors declare that there are no conflicts of interest regarding the publication of this research study. This research was conducted impartially and without bias, and the findings and conclusions presented are solely based on the data collected and analyzed during the study.

The authors declare that they have no financial or personal relationships with other people or organizations that could inappropriately influence (bias) their work. There are no professional or personal conflicts of interest to disclose that could have influenced the research or interpretation of the findings presented in this study.

Competing Interests and Funding

The authors declare that there is no external funding or competing interests have influenced the design, execution, or interpretation of the research.

References

1. American Red Cross. (n.d.). What is basic life support (BLS)?
2. Akhu-Zaheya L, Gharaibeh M, Alostaz Z (2013) Effectiveness of simulation on knowledge acquisition, knowledge retention, and Self-Efficacy of nursing students in Jordan. Clinical Simulation in Nursing 9: e335-e342.
3. American Heart Association. (n.d.). What is CPR?
4. Desai R, Das S (2017) Emergence of EMS in India. Journal of Emergency Medical Services.
5. Folke F, Andelius L, Gregers MT, Hansen CM (2021) Activation of citizen responders to out-of-hospital cardiac arrest. Curr Opin Crit Care 27: 209-215.
6. Kose S, Akin S, Mendi O, Goktas S (2019) The effectiveness of basic life support training on nursing students‘ knowledge and basic life support practices: a non-randomized quasi-experimental study. Afr Health Sci 19: 2252-2262.
7. Patel H, Mahtani AU, Mehta LS, Kalra A, Prabhakaran D, et al. (2023) Outcomes of out of hospital sudden cardiac arrest in India: A review and proposed reforms. Indian Heart J 75: 321-326.