

## Biomedical Communication

# Effectiveness of Simulation As a Technique vs Traditional Method on Knowledge and Practice Regarding Basic Life Support: An Experimental Study

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### ABSTRACT

Instantaneous institution of Basic life Support (BLS) with Cardiovascular Resuscitation is one of the crucial factors in the survival of cardiac arrest patient. However, ability to learn and retain BLS skill remains questionable. The present study was aimed to compare the effectiveness of teaching BLS skills via simulation technique vs. traditional method to B.Sc. Nursing students and BPT 1st year students of SGT University, Budhera, Gurugram. The investigator prepared the list of all the students from first year B.Sc. Nursing and BPT first year and from that, the investigator selected the samples using simple random probability sampling technique. Before going ahead with data collection, a written consent was taken from the students regarding their willingness to participate in the research study. Then data regarding socio demographic variables was collected followed by a pre -test using knowledge questionnaire and practice checklist. On experimental group, simulation technique was used to teach BLS and control group learnt BLS in traditional way. After 7 days post-test was taken to assess the change in knowledge and practice regarding BLS. Mean post-test knowledge score for experimental group was high i.e., 18.40 in as compared to pre-test knowledge score of 12.90. Mean practice score for experimental group was high i.e., 10.00 as compared to mean pre-test practice score of 4.50. In control group, no significant difference was reported between pre-test and post-test knowledge as well as practice score. This study generates evidence that Simulation is more effective as a technique to teach BLS to student more effective as compared to conventional method.

**KEY WORDS:** BASIC LIFE SUPPORT, EFFECTIVENESS, KNOWLEDGE, PRACTICE, SIMULATION.

### INTRODUCTION

Heart disease being the world's largest killer leads to death of around 175 lakh people in a year. In Indian Scenario, one Indian dies about every 29 seconds because of heart problems. Around twenty thousand new cases of heart problems develop every day. Overall, in India around 90 million of general public suffer from cardiac disease and around one third more are at great risk (Dahiya and Milan 2016). In case of cardiac arrest, an effective BLS can help save life. ABC is the most important aspects in Basic Life Support, which expands to the A-airway, B-breathing and C-circulation. If the circulation fails for three to four minutes, it will cause irreversible cerebral impairment (Lewis et al. 2017). Once a patient progresses into asystole, his probability of survival decreases by seven to ten per cent

for every minute that passes by, until a defibrillator comes for his rescue (Dick-Smith et al. 2021).

In case of a sudden asystole, a prompt and efficacious treatment is very essential to get positive results. With a timely and effective resuscitation, deaths of many patients with cardiac arrests can be avoided (Madams 2003). Basic Life Support acts as a saviour to cease the aggravation of the critical state functioning of brain and heart till the time defibrillation and/or advance life support are provided. With the implementation of two most important actions i.e., recognition of asystole in early stage and instant commencement of Basic Life Support can increase the probability of patient's survival almost twice (Moule 2002). These days, in nursing education, more importance is given to training on Basic Life Support because if a nurse is competent enough to perform Basic Life Support will lead to a significant difference between life and death of a victim (Dick-Smith et al. 2021).

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It is a skill that is very much essential to be taught to the nursing students. It is very much needed that nurses have the skills to assess early for asystole and promptly institute Basic Life Support which includes preserving of respiration and circulation for the casualty prior to arrival of emergency services, or advanced life support service to save the lives of patients who are in danger. Regular training and as well as updates in resuscitation must be imparted to all the nurses. As registered nurses, each and every nursing personnel has an obligation to ensure to remain competent to perform resuscitation. Health is never static rather a dynamic state. It continually changes from minute to minute, day to day and year to year as we grow. Health is considered as a vital factor for everyone because we can appreciate life the most when we are in a healthy state. Historically, health was considered to be the exact opposite of illness. Mere absence of illness or disease was a sign of good health. Today, the new definition of health encompasses not only physical aspects, but social, mental and spiritual dimensions. The most modern definition of health according to WHO is, "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (Regional Office for Africa 2006; Loyola 2010; Süß-Havemann et al. 2020).

The burden of cardiovascular disease (CVD) in India is among the highest globally. The annual number of CVD fatalities in India increased from 2.26 million in 1990 to 4.77 million in 2020 (Murray and Lopez 1997). Coronary heart disease prevalence rates in India have been estimated over the past several decades and have ranged from 1.6% to 7.4% in rural populations and from 1% to 13.2% in urban populations (Gupta et al. 2008). Worldwide the most common cause of death shared by both males and females is due to cardio vascular disease. One of the leading public health problems is sudden cardiac arrest which needs to be managed by Basic Life Support. In Basic Life Support (BLS) management of cardiac arrest patients is such designed so as to sustain sufficient circulation and ventilation, sans medications or any kind of advance medical devices (Parashar 2010; Süß-Havemann et al. 2020).

Under the umbrella of Basic Life Support (BLS) comes recognition of signs of sudden cardiac arrest (SCA), heart attack, stroke, foreign-body airway obstruction (FBAO); and most importantly cardiopulmonary resuscitation (CPR) (Parashar 2010). Being trained to perform Basic Life Support can make a marked difference in the existence of a casualty's life. Nurses perform an assessment for cardiac arrest and accordingly must initiate Basic Life Support and involves maintaining respiration and circulation for the fatality until emergency services, or advanced life support services, arrive. As all nurses have a responsibility for managing the patients competently, they must be offered training and refreshers consistently in resuscitation. Being a registered nurse, it is the self-responsibility of each nurse to ensure to remain proficient to perform resuscitation (Botha et al. 2012). Sequence of actions in Cardio pulmonary resuscitation improves the chances of survival succeeding cardiac arrest. A combined set of coordinated actions is integral to a productive resuscitation following an arrest requires an integrated set of co-ordinated actions

represented by the links in the chain of survival (Süß-Havemann et al. 2020).

In (1962), the American Heart Association (AHA) pioneered in establishing guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care which commenced the efforts to medically improve CPR and is continued up till now. Research evidences from various clinical studies have been applied recurrently to CPR. The newest development in the CPR guidelines is a change in the BLS sequence of steps from "A-B-C" (airway, breathing, compressions) to "C-A-B" (compression, airway, and breathing). The key to obtain best results which go beyond return of spontaneous circulation is high quality CPR. And the ultimate goal of a revival system of care is to return to a former quality and efficient state of health. Between 2008 and 2030, in a span of 22 years, the global inhabitation is estimated to grow by 20%, from 600.7 million to 800.1 million people. In 2008, if we consider top ten causes for mortality worldwide, other than injuries, five were non-communicable diseases; this will go up to seven out of ten by the year 2030. In fact, CVDs would be the single largest cause of death in the world accounting for more than a 33% of all deaths (Prakash 2009; Lee 2012; Wilson et al. 2020).

In the lifetime of a human being the risk of developing coronary heart disease at the age of 40 is 49% for men and 32% for women. In United States, there is a fatality every minute from coronary heart disease. Due to sudden cardiac arrest, the average number of years of life lost is 15 years. Generally, half of men and around 2/3rd of women who die suddenly from coronary heart disease are asymptomatic before that (Regional Office for Africa 2006; Lee 2012). Every Year, more than 10 lakh heart attacks happen and around 1/4th of people die prior to getting to a hospital. Current studies prove that cardiac arrest is becoming the number one cause of death. In reality, research reports have reported that all heart attacks which occur inside home most likely happen to a family member or friend and number is around 80%. There are more chances that a patient having out-of-hospital cardiac arrest will come out of it safely if there is rapid institution of bystander cardiopulmonary resuscitation (CPR) corresponding to early arrival of BLS trained rescuers and advance equipment. Survival rate increases 2-3 folds if there is rapid occurrence of combination of critical steps viz. bystander CPR comprising airway opening, rescue breathing, and external chest compression along with prompt response from call for ambulance (Wilson et al. 2020).

New Zealand Government, Department of Occupational Health and Safety has given due recognition and importance to CPR and basic emergency care by incorporating these subjects in the school curriculum (albeit as an optional subject) and by providing first aid training at workplace (Eisenberg and Mengert 2001). Competency in Basic Life Support is well-thought-out as a vital skill for health care workers. It is a widely anticipated among community high standards are maintained in nursing education regarding the knowledge and competence in Basic Life Support. Nursing students report that the most nerve racking state that the

nursing students have to cope with after their registration is engaging in both fruitful as well as unsuccessful cardiopulmonary resuscitation and Basic Life Support. An in-depth understanding and proficiency to perform Basic Life Support will put them in an advantageous position for the best survival of the patient whenever it's needed (Inwood 1996; Wilson et al. 2020).

A learning which is regulated by a motivated student himself is better able to support learning the skill in BLS training in students (Süss-Havemann et al. 2020). Competency is essential for effective BLS skills such as the depth of cardiac compression, number of compressions per minute and releasing the pressure off the chest while giving compressions are very efficiently delivered by an automated manikin. Hence the assigning of the training of the psychomotor component of cardiac compressions to a simulation station would be truly effective for student learning (Wilson et al. 2020). Study was conducted with primary objective to evaluate the effectiveness of simulation technique over conventional technique in terms of understanding and competency regarding basic life support among Nursing and Physiotherapy students.

## MATERIAL AND METHODS

The study was conducted on 60 students studying in 1st year B.Sc. Nursing and BPT 1st year students in SGT University and fulfilled the inclusion criteria. The investigator employed probability sampling technique using simple random

sampling to draw 60 samples from the study population. The tool used in this study comprised of three sections. Section A consists of Socio demographic variables, Section B consists of Knowledge questionnaire and Section C consists of Observational check list. The data was collected over a period of 4 weeks at SGT University, Faculty of Nursing and Faculty of Physiotherapy Departments, Gurugram, an initial permission was taken from university as well as took grant of a formal permission from the Dean, Faculty of Nursing. All the participants were assured regarding maintaining the anonymity of their identity and confidentiality of the data. Socio demographic data was collected by the investigator after giving explanation to the participants regarding the purpose of the study and written consent was taken from the participants. This was followed by filling up of knowledge questionnaire by the participants and completion of observational checklist by the researcher.

## RESULTS AND DISCUSSION

Table no. 1 depicts that 3% students had good knowledge from pre-experimental group, 90% had average and 7% students had poor knowledge whereas from post-experimental group 53% had good knowledge and 47% had average level of knowledge regarding BLS. No student was found having poor knowledge in post-test. From control group, in pre-test, no students had good knowledge while 80% had average and remaining 20% had poor knowledge regarding BLS. In post-test, only 3% students had good knowledge while 80% had average and 17% had poor knowledge.

**Table 1. Pre – test and Post-test Level of knowledge regarding BLS among experimental and control group.**

Criteria Measure of Knowledge Score				
Score Level	Pre-test Score Experimental Group	Pre-test Score Control Group	Post-test Score Experimental Group	Post-test Score Control Group
Good(19-28)	1(3.3%)	0(0%)	16(53.3%)	1(3.3%)
Average (10-18)	27(90%)	24(80%)	14(46.7%)	24(80%)
Poor(0-9)	2(6.7%)	6(20%)	0(0%)	5(16.7%)

**Table 2. Pre-test and post-test level of practice regarding BLS among Experimental group and Control group.**

Score Level	Pre-Experimental	Pre-Control	Post Experimental	Post Control
Good(9-12)	0(0%)	0(0%)	22(73.3%)	0(0%)
Average (5-8)	18(60%)	22(73.3%)	8(26.7%)	20(66.7%)
Poor(0-4)	12(40%)	8(26.7%)	0(0%)	10(33.3%)

Table 2 depicts that in pre-experimental group, there is not any student who had good level of practice but 60% students had average and remaining 40% had poor level of practice whereas in post-experimental group 73.3% had good level of practice and 27% had average level. No student was

found having poor level of practice in post-experimental group. Talking of pre-control group, no students had good level of practice, 73% had average and remaining 27% had poor level of practice regarding BLS. In post-control, 67%

students had average level of practice while 33% had poor level of practice.

In above Table 3.1, to compare the knowledge score within the group paired t-test was conducted where results revealed that mean score of post-tests from experimental group is high as compared to post-test from control group.

**Table 3.1 Mean pre-test and post-test knowledge score regarding BLS among Experimental and Control Group and corresponding t value**

		Knowledge Score				paired t test		
		Pre-test Mean and SD		Post-test Mean and SD				
Group	N	Mean pre-test score	SD	Mean post-test score	SD	df	't' value	Result
Experimental Group	30	12.90	2.537	18.40	2.762	29	10.483	Significant
Control Group	30	12.633	2.684	11.63	4.406	29	1.258	Not Significant
Unpaired 't' Test	Df	58		Df	58			
	Value of 't'	0.395		Value of 't'	7.127			
	Result	Not Significant		Result	Significant			

**Table 3.2 Mean Pre-test and Post-test practice score regarding BLS among experimental and control group.**

Group	N	Mean Practice Score Pre-test (practice)		Mean Score Post-test (practice)		Paired 't' Test		
		Mean practice score	SD	Mean practice score	SD	df	Value of 't'	Result
Experimental group	30	4.50	1.737	10.00	1.819	29	17.343	*Significant
Control group	30	5.267	1.230	5.27	1.507	29	0.000	Not Significant
	df	58		df	58			
	Value of 't'	1.973		Value of 't'	10.974			
	Result	Not Significant		Result	*Significant			

To compare the mean pre-test and post-test knowledge score between two groups, unpaired t-test was conducted where results showed that mean score for experimental group

was high i.e. 18.40 in post-test knowledge as compared to pre-test knowledge while in control group, pre-knowledge score was high i.e. 12.63 as compared to post-knowledge

score. Hence the Simulation as a technique enhanced the knowledge regarding BLS among B.Sc. Nursing 1st year students. These findings were found congruent with study done by Kose et al. (2019) on nursing students reported results in line with the present study that simulation is effective in improving knowledge and practice of basic life support in nursing students. The findings were also supported by the study done by Daniel and Evangeline (2018) to teach Basic life support to medical students using simulation was found effective and supports the findings of this study (Daniel and Evangeline 2018; Kose et al. 2019).

In Table 3.2 to compare the practice score within the group, paired t-test has been conducted where results revealed that mean score of post-test from experimental group is high as compared to post-test from control group and mean score of post-test was also high from pre-test of control group. To compare the pre and post-practice score between the groups, unpaired t-test was conducted where results revealed that mean score for experimental group was high i.e. 10.00 in post-practice as compared to pre-practice while in control group.

These Findings were found congruent with the study done by Aqel and Ahmad (2014) and Tawalbeh and Tubaishat (2014) obtained statistically significant results for clinical simulation in CPR as compared to other technique and thus supported the findings of the present research and thus created the evidence to promote the use of simulation in nursing education. Recent research conducted by Sandy et al. (2021) reported that there was an increase in clinical simulation of paramedics bridged the lacuna between theory and practice to deal with emergency situations. It was proved by their enhanced satisfaction and confidence level after undergoing simulation training. (Aqel and Ahmad 2014; Tawalbeh and Tubaishat 2014; Sandy et al. 2021).

## CONCLUSION

The findings of the present study concludes that Simulation on Basic life support was effective in improving knowledge and practice of B.Sc. nursing 1st year student. In pre- test the experimental group, 3% students had good knowledge and 0% students had good practice, 90% had average knowledge and 60% had average practice and 7% had poor knowledge and 40% had poor practice. While in post-test, of experimental group 53% had good knowledge and 73% had good practice and 47% had average knowledge score and 27% had average practice. This showed that there was significant improvement in knowledge and practice of students.

**Conflicts of interests:** Authors have no conflict of interests to disclose.

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