

# Enhancing Life-saving Skills: Evaluating the Impact of an Educational Module on Cardiopulmonary Resuscitation

Deepika Dasar<sup>1\*</sup>, Jayashree G Itti<sup>2</sup>, Shivanand D<sup>3</sup>, Javeed B<sup>3</sup>, Kaveri T<sup>3</sup>, Shridevi S<sup>3</sup>

<sup>1</sup>Lecturer, Dept. of Medical Surgical Nursing, Shri B.V.V.S. Institute of Nursing Sciences, Bagalkot. Karnataka, India

<sup>2</sup>Principal, Dept. of Community Health Nursing, Shri B.V.V.S. Institute of Nursing Sciences Bagalkot, Karnataka, India

<sup>3</sup>Student, Dept. of Medical Surgical Nursing, Shri B.V.V.S. Institute of Nursing Sciences, Bagalkot. Karnataka, India

**\*Address for Correspondence:** Deepika Dasar, Lecturer, Dept. of Medical-Surgical Nursing, Shri B. V. V. S. Institute of Nursing Sciences, Bagalkot- 587101, India

**E-mail:** [deepikadasar203@gmail.com](mailto:deepikadasar203@gmail.com)

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## ABSTRACT

**Background:** Cardiovascular disease (CVD) is the leading cause of death worldwide. This means that approximately 17.3 million deaths are reported annually, and this figure is expected to reach 23.3 million by 2030. Developing countries are facing increasing numbers of NCDs; 42% of NCD-related deaths are due to cardiovascular diseases. The term CVD is broad and describes many conditions related to the heart and blood vessels. Some of these are caused by vascular occlusion, causing ischemic heart disease, such as myocardial infarction, angina, or stroke.

**Methods:** In this study, pretest, group pretest, and posttest were applied. A simple random sampling technique was used to select 50 students and collect data through a survey on knowledge and CPR behaviour. After data collection, subjects underwent a training session and 8 days later, a test was administered using the same questionnaire and behavioural assessment.

**Results:** The pretest indicated that 34% of students had average CPR knowledge, 66% were poor, and 94% were inadequate. The student's attitude towards CPR indicated that 92% performed average, 8% did poorly, and 92% did well in the subsequent exam. Pretest knowledge score ( $7.44 \pm 1.97$ ) was greater than post-test ( $17.16 \pm 1.60$ ),  $t(49) = 2.048$ ,  $p < 0.05$ . Pretest mean attitude score ( $22.7 \pm 2.58$ ) was greater than post-test ( $12.46 \pm 2.82$ ),  $t(49) = 2.048$ ,  $p < 0.05$ .

**Conclusion:** The study's findings have important implications for the nursing profession. Such as in nursing practice, nursing education, and nursing research.

**Key-words:** Cardiopulmonary resuscitation, Educational module, Focused Assessment with Sonography in Trauma, ATLS method

## INTRODUCTION

Cardiopulmonary Resuscitation (CPR) is a life-saving procedure used in emergencies when a person is experiencing abnormal breathing or has had a cardiac arrest <sup>[1]</sup>. This entails the simultaneous use of thoracic compressions and rescue ventilation (mouth-to-mouth). The main objective of CPR is to maintain blood flow and guarantee oxygen supply to the body until expert medical assistance is available.

Although some remaining oxygen could still be in the bloodstream, efficient CPR ensures correct circulation. Focused Assessment with Sonography in Trauma (FAST) uses ultrasound to identify hemoperitoneum and hemopericardium in trauma patients. Since 2007, it has been employed as an auxiliary in primary surveys and the ATLS method. Ultrasonography is not the gold standard for diagnosing intra-abdominal damage, but its portability, convenience, and radiation-free repeatability have made it popular <sup>[2-4]</sup>. Emergency departments commonly do FAST for trauma victims.

Basic first aid and CPR proficiency are essential since they can determine whether someone lives or dies. Although CPR does not ensure life, it substantially enhances the likelihood of recovery by providing a crucial period of opportunity. In the absence of this intervention, the brain and other organs may experience

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hypoxia within a matter of minutes <sup>[4]</sup>.

CPR closes the crucial time interval between an emergency and the arrival of skilled medical help. It serves as a transient life-sustaining device, providing crucial time for the person until sophisticated medical treatment can be provided. The need for prompt and precise CPR cannot be emphasized enough, as each passing second without enough blood flow decreases the probability of a favourable result <sup>[5]</sup>.

CPR is an essential skill that enables anyone to act as first responders in emergencies. Proficiency in doing efficient chest compressions and rescue breathing is crucial for maintaining life until experienced medical experts arrive. This potent tool offers optimism and a viable opportunity to those with life-endangering circumstances. Hence, promoting awareness and instruction on CPR is helpful and a concrete method of effecting change in an emergency <sup>[5-7]</sup>.

## MATERIALS AND METHODS

**Source of Data-** The present study collected data from college students.

**Data collection tool-** The sample of this study consisted of 50 undergraduate students studying at Government First Year College, Bagalkot.

**Sample and number of samples-** This sample comprises the research population's classes. The sample size of this study is Bagalkot Degree College students (n=50).

**Procedure for data collection-** The research was conducted at Science PU College, Bagalkot, between 7 February 2023 and 14 February 2023. This study consists of undergraduate students from various pre-university colleges of Bagalkot University. Fifty students were assigned to use or self-administer a survey consisting of knowledge and attitude questions. The inclusion criteria were selected using a simple randomization technique.

**Data collection tools-** A semi-structured survey was used to collect data in this study.

**Research approach-** This study is an experimental study that aims to obtain information about the knowledge and attitudes of university students by asking direct questions to a sample group. While this study aimed to identify the CPR training module's effectiveness in terms

of college students' knowledge and behaviour in Bagalkot, an experiment was designed.

**Research Design-** The plans created by the researcher to find answers to research questions or test research findings are called research design. The design was a research study evaluating data on college students' knowledge and attitudes about CPR. The research design represents the population, sample size, variables, data collection tools and methods, and data analysis plans.

## Variables

**Dependent variable-** Evaluation of the knowledge of mothers with children under five years of age regarding vitamin A deficiency.

**Independent variable-** University students' knowledge about cardiopulmonary resuscitation.

**Demographic variables-** Sociodemographic variables include the sociodemographic characteristics of the students. Age and gender, type of religion of the family, education level of the father, education level of the mother, monthly income of the family, and place of residence, etc.

**Statistical analysis-** Data analysis is the organization and synthesis of research data and the use of collected data to test research hypotheses. Data were analyzed using descriptive and inferential statistical methods. Population data was analyzed using frequency and percentage distribution. Use mean and standard deviation to evaluate college students' scores. The chi-square test is used to find the relationship between college students' knowledge and their choices, which differ from the population's.

**Ethical Approval-** An ethical clearance was obtained and enclosed from the ethical committee of B.V.V.S Sajjalashree Institute of Nursing Sciences, Bagalkot.

## RESULTS

**Socio-demographic variables of students of degree college-** This study shows that in comparing the total mean percentage of knowledge scores at the pre-test and post-test, the mean knowledge of male college girls increased by 48.8% points after the end of the study module.

The mean post-test score for “knowledge of breast cardiopulmonary resuscitation” was  $17.16 \pm SD\ 1.60$ , accounting for 85.5% of the total score. The estimated mean knowledge is 7.44,  $SD \pm 1.97$ , corresponding to 37.2% of the total score. The knowledge score for the

effectiveness of the training model in this area is  $9.72$ ,  $SD \pm 0.3$ , accounting for 48.8% of the total score. Therefore, this shows that the education model effectively improves university students' knowledge (Table 1).

**Table 1:** Frequency and percentage distribution of sociodemographic variables

Socio-demographic factor	Frequency	Percentage (%)
Age	03	6
	14	28
	30	60
Gender	03	6
	16	32
	34	68
Type of Family	23	46
	27	54
	46	92
Religion	4	8
	0	0
	22	44
Education of Father	28	56
	17	34
	23	66
Education of Mother	33	66
	10	20
	03	6
Family monthly income	33	66
	10	20
	03	6
Family monthly Income	33	66
	10	20
	03	6
Type of Residential Area	04	8
	06	12
	44	88
Received Information about CPR	09	18
	30	60
	07	14
	04	8

Table 2 shows the pre-and post-test results measuring the degree of students' cardiopulmonary resuscitation (CPR) knowledge. The knowledge area is evaluated on a scale from 1–20. The average score of the students in the Pre-Test was  $7.44 \pm 1.97$ , which is 37.2% of the maximum score. However, after the test, the average score rose to

$17.16 \pm 1.60$ , 85.5% of the maximum score. The intervention was successful with a rate of  $9.72 \pm 0.3$  (48.8%), which is determined by comparing the scores after the test with those before the test. This shows that degree students' CPR knowledge significantly improved after the intervention.

**Table 2:** Assess the knowledge of Degree students about cardiopulmonary resuscitation

Knowledge area	Max. score	Pre-Test (O <sub>1</sub> )		Post-Test (O <sub>2</sub> )		Effectiveness (O <sub>2</sub> -O <sub>1</sub> )	
		Mean ±SD	Mean (%)	Mean ±SD	Mean (%)	Mean ±SD	Mean (%)
Knowledge related to CPR	20	7.44 ±1.97	37.2	17.16±1.60	85.50	9.72±0.30	48.80

**Educational module on an attitude of cardiopulmonary resuscitation-** The overall findings show that the post-test Attitude score (12.46±2.82), which was 41.53% of the total score, was more when compared to the pre-test attitude score (22.7±2.58), which was 38.6% of the

total score. The effectiveness of the educational module in this area was the mean attitude score was 0.88 with SD±0.24, which was 2.93% of the total score. Hence, it indicates that the educational module effectively enhanced college students' knowledge (Table 3).

**Table 3:** Effectiveness of educational module on attitude of cardiopulmonary resuscitation

Area	Max. score	Pre-Test (O <sub>1</sub> )		Post-Test (O <sub>2</sub> )		Effectiveness (O <sub>2</sub> - O <sub>1</sub> )	
		Mean ±SD	Mean (%)	Mean±SD	Mean (%)	Mean ±SD	Mean (%)
Attitude	30	22.7±2.58	38.6	12.46±2.82	41.53	0.88±0.24	2.93

Table 4 shows how socio-demographic characteristics affect students' knowledge. The chi-square test assessed associations. Age (p=0.99), gender (p=0.79), type of family (p=0.68), religion (p=0.307), parents' education (p=0.88 for father, p=0.862 for mother), monthly family income (p=0.66), and residential region (p=0.67) had no

statistically significant relationships. No significant correlation was found between knowledge and whether students got CPR education (p=0.462) or its source (p=0.170). This suggests that socio-demographic characteristics did not substantially affect students' CPR knowledge.

**Table 4:** Association between students' knowledge with their selected socio-demographic variables

Socio demographic variables	DF	Chi-square value	p-value
Age	3	0.28	0.99*
Gender	1	0.07	0.79*
Type of family	1	0.17	0.68*
Religion	1	1.09	0.30*
Education of Father	1	0.02	0.88*
Education of mother	1	0.03	0.86*
Monthly family income	2	0.83	0.66*
Type of residential area	1	0.18	0.67*
Have you received any information about CPR	1	0.54	0.46*
If yes, the Source of information	2	3.54	0.17*

\*All the values are statistically non-significant.

## DISCUSSION

This study aims to evaluate the effectiveness of the CPR training module in terms of the knowledge and attitude of college students of the selected school in Bagalkot <sup>[7-9]</sup>. The results of this study were followed and supported by a study by Gurung *et al.* <sup>[10]</sup>. Nurse education affects the performance and benefits of CPR, so physicians need to be trained in CPR knowledge. Improve education. The survey consists of three sections covering cardiology knowledge: The first section is a general question to understand the importance of cardiology in clinical practice; the second part contains the main purpose and real effect of cardiopulmonary resuscitation. The previous study found that the panel data regression analysis reveals that the corrected R-squared value indicates a coefficient of determination of 19.32%. The coefficient of determination achieved with the random effect model is deemed satisfactory.

Furthermore, the test results indicated a satisfactory Durbin-Watson statistic score of 1.90. The panel data regression analysis using the random effect model reveals the distinct impact of the cross-sectional (province) data on the constants of the research model. The Likelihood Ratio Test determines whether the model was examined using the fixed effect or pooled least squares approach. The F-stat test technique, which involves a hypothesis, is used to conduct this test <sup>[11]</sup>.

Descriptive statistics and multiple response analyses were performed using IBM SPSS version 20. Findings indicate that students understand the importance of CPR in healthcare and that their knowledge is intertwined with their teaching and performance. The F-test determines whether the independent factors, individually or collectively, significantly impact the dependent variable <sup>[12-14]</sup>. To do this test, one might compare the probability value with a 5% or 1% significance level. If the probability shown is more than 5%, the model is rejected; if it is less than 5%, it is approved. The test findings obtained from the Fixed Effect Model indicate an F-statistic value of 20.04 and a probability value (F-statistic) of 0.00. Based on the analysis of probability values (F-statistics) below the threshold of  $\alpha=0.05$ , it may be inferred that all independent variables collectively substantially impact the dependent variable. More than 50 years after closed chest CPR was introduced, cardiac arrest outcomes are still low <sup>[15]</sup>. Over the last 20 years, better knowledge of

heart-brain-lung connections have led to new resuscitation procedures and technology that enhance cardiac arrest outcomes. This article emphasizes CPR quality, current intrathoracic pressure regulation methods to promote cerebral and systemic perfusion, and continuing research to reduce reperfusion damage during CPR. Cardiac arrest is the major cause of prehospital and in-hospital deaths <sup>[1]</sup>. For decades, scientists and medics have focused on cardiac arrest resuscitation <sup>[16]</sup>. Most patients are never revived <sup>[13-15]</sup>.

According to published data, survival rates following cardiac arrest are low, with out-of-hospital nontraumatic cardiac arrest rates ranging from 1% to <20% and in-hospital rates <40%. Total 10%–50% have neurological dysfunction <sup>[17]</sup>. The physiologic concepts of CPR are poorly understood and contentious <sup>[18]</sup>. Some say that present cardiac arrest techniques are terminally faulty, resulting in a survival rate of 7% for out-of-hospital and <30% for in-hospital cardiac arrest nationally over 50 years <sup>[17]</sup>. Primary or ischemia-induced arrhythmia, pulmonary emboli, haemorrhage, trauma, and medication/drug overdose are the top causes of cardiac arrest and need urgent cardio cerebral circulation <sup>[18]</sup>. Blood flow and aortic pressure are essential to resuscitation. Reduce cardiac arrest morbidity and mortality by understanding the complicated physiology of cardiocerebral perfusion during CPR. Vital organ flow improvement is necessary but frequently inadequate to save lives following cardiac arrest.

The study was conducted by Demirtas *et al.* <sup>[5]</sup>; the data was obtained using the "CPR Information Survey" and the good paper data was obtained using the "Meeting Session Paper". It was written in four group meetings with six participants each. The results of this study are that the students' estimated mean CPR knowledge score before simulation-based CPR training was  $5.66 \pm 1.97$  out of 10.0. Posttest CPR knowledge score ( $8.38 \pm 1.30$ ) increased significantly ( $p < 0.001$ ) after stimulation. Additionally, the mean of posttest CPR scores was higher than the pretest CPR proficiency scores ( $p < 0.001$ ). The study concluded that simulation-based CPR training improved students' knowledge and skill levels.

Additionally, satisfaction and self-confidence were higher after the simulation training <sup>[19]</sup>. To represent the coefficient of determination, we use the symbol  $R^2$ . The coefficient in question serves as an indicator of the validity of the computed regression model. In simpler



terms, the value quantifies the proximity of the calculated regression line to the real data. Nevertheless, several studies advocate for using the Adjusted R<sup>2</sup> value due to its ability to accurately reflect changes in the model when an independent variable is included, unlike the R<sup>2</sup> value. The test results obtained from the Random Effect Model provide an adjusted R<sup>2</sup> value of 0.193299, which corresponds to 19.33% [20].

## CONCLUSIONS

In conclusion, through an effective educational module, the study demonstrates a significant improvement in cardiopulmonary resuscitation (CPR) knowledge and attitude among degree college students. The intervention increased the mean knowledge score by 48.8%, highlighting its success in enhancing CPR awareness. Similarly, the post-test attitude score showed a substantial improvement of 2.93%. Sociodemographic factors did not significantly influence CPR knowledge, emphasizing the universality of the educational impact. The research gap lies in understanding the long-term retention of CPR knowledge and attitude among degree college students. Additionally, investigating the impact of diverse teaching methods and exploring potential barriers to CPR education uptake would contribute to a more comprehensive understanding of effective life-support training in educational settings. The major cause of mortality is heart disease.

Thus, training young people in CPR will increase their understanding and avoid additional problems, and his study can discuss new findings on CPR-related cardiac and brain blood flow. This will lower future heart disease risk due to a sedentary lifestyle, obesity, and smoking; older individuals have cardiac difficulties.

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## CONTRIBUTION OF AUTHORS

**Research concept-** Prof Jayashri G Itti, Ms Deepika Dasar.

**Research design-** Ms Deepika Dasar

**Supervision-** Ms Deepika Dasar

**Materials-** All researchers

**Data collection-** All researchers

**Data analysis and interpretation-** All researchers

**Literature search-** Prof Jayashri G Itti

**Writing article-** All researchers

**Critical review-** Ms Deepika Dasar

**Article editing-** Ms Deepika Dasar

**Final approval-** Prof Jayashree G Itti

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