Assessment of Knowledge on Basic Life support and Advanced Cardiac Life Support in a Medical College of Kathmandu

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ABSTRACT

Introduction: Basic Life Support (BLS) and Advanced Cardiac Life Support (ACLS) are part of cardio-pulmonary resuscitation. The knowledge of BLS and ACLS is very important in saving lives for healthcare workers for which they need training and updated knowledge on these topics. The aim of the study was to assess the knowledge on BLS and ACLS in a medical college of Kathmandu.

Methods: This was a cross sectional retrospective study conducted in Nepalese Army Institute of Health Sciences. The pretest and posttest scores of the trainees who participated in BLS and ACLS training were analyzed to assess the improvement in the knowledge. The duration of the study was from 1st May 2021 to 31st October 2021 where two sessions of the training were conducted. Data were entered in Microsoft Excel and analysis was done in Statistical Package for Social Sciences version 16.

Results: Out of 72 participants, the mean pretest score was 5.67 ± 1.91 (56.67%) on BLS (Total score 10) and 9.06 ± 2.21 (60.37%) on ACLS (Total score 15). Post-test scores for BLS and ACLS were 8.69 ± 1.03 (86.94%) and 11.43 ± 1.77 (76.20%) respectively. Statistically significant increase in the mean scores were seen in both BLS [df (71) = -13.532, $p < 0.001$] and ACLS ([df (71) = -9.956, $p < 0.001$] with 95% CI while comparing pretest BLS and ACLS with posttest BLS and ACLS scores.

Conclusions: Improvement in knowledge was seen amongst participants after the training. This highlights the importance of such training in imparting knowledge regarding BLS and ACLS among healthcare personnel.

Key Words: ACLS; BLS; Cardio-pulmonary resuscitation; Training

INTRODUCTION

Cardiac diseases are among the leading causes of death worldwide.[1] Cardiac arrest is a life-threatening fatal condition where the heart suddenly stops as a result there is no flow of blood to the vital organs. If timely intervention is not done, the outcome is fatal. Cardiopulmonary resuscitation (CPR) is an emergency medical procedure which comprises repeated cycles of chest compressions and artificial respiration.[2] It basically has two components Basic Life Support (BLS) and Advanced Cardiac Life Support (ACLS). Effective and early CPR is vital in saving lives during cardiac respiratory arrest.[3,4] Successful CPR delays tissue death and increases the chance of survival by maintaining oxygenated blood flow to all vital organs.[5]

The knowledge of CPR is very important to everyone in saving lives. Based on medical knowledge of the CPR provider, CPR may be bystander CPR, out of hospital, or in the hospital.[6,7] Knowledge about CPR is a must amongst healthcare professionals although studies have shown inadequate knowledge about CPR in the healthcare settings.[8–11] CPR is a skill that requires constant training and practice. American Heart Association (AHA) and American College of Cardiology (ACC) are the bodies that formulate the guidelines for BLS and ACLS. Based on these ACC / AHA guidelines, institutions around the world conduct the training on CPR.

Nepal Army Institute of Health Sciences (NAIHS) also conducts BLS and ACLS training based on AHA/ACC guidelines. The training has been conducted frequently for the last five years. During this period, more than 300 trainees have benefited from the training. As evidenced by the studies, there is definite improvement in the outcome of CPR in tertiary care settings after BLS and ACLS training.[12] It is seen that such training helps to improve the knowledge and cognitive abilities of healthcare professionals and medical students according to studies conducted on different medical professionals.[13–16] The aim of the study was to analyze the data from training conducted in NAIHS to assess the knowledge on BLS and ACLS before and after the training.

METHODS

This is a cross sectional, observational study. Ethical approval was taken from the Institutional Review Committee (IRC) of NAIHS (Ref. No 484). The place of study was NAIHS and the duration was from 1 May 2021 to 31 October 2021. Each BLS / ACLS training was conducted in NAIHS for three days. The contents used in the training were as per the AHA guidelines and standards. Instructors were certified and experienced. The participants in the training were MBBS doctors, interns, resident doctors of various faculties, nurses and faculty members. The selection of the trainee was done on the basis of quota system, distributed by NAIHS to various faculties and departments. The training packages included lectures using PowerPoint presentation and video clippings, demonstration and hands-on training on adult, child and infant mannequins involving cardiac arrest scenarios. During three days training, a pretest was taken at the beginning of the course by the trainees. The questions asked were standard questions prepared by the instructors. There were a total of 25 multiple choice questions out of which 10 were related to BLS and the rest 15 were related to ACLS. After the pretest, BLS was conducted on the first day and ACLS was conducted on the second and the third day. After the completion of the course, a post test was taken. The questions asked in the post test were the same as the pretest. The score of the pre and posttest was recorded. During the study period, two sessions of BLS and ACLS training were conducted. The score of the trainees in pre and posttest was obtained from the training cell record section. All participants who completed pretest and posttest during the training conducted from 1 May 2021 to 31 October 2021 were included in the study. Data were entered and coded using Microsoft Excel 2019 and statistical analysis was done using Statistical Package for Social Sciences (SPSS) version 16. The data were expressed as mean, standard deviation and percentages. Pie-chart and line diagrams were used wherever applicable. Paired t test was used to see the difference in mean scores of pretest and posttest. A p-value of < 0.05 was considered significant.

RESULTS

A total of two training sessions of BLS and ACLS were conducted during the study period of six months. During these training sessions, a total of 72 participated in the training. All the participants appeared in both the pretest and the posttest. There was equal distribution of the male and female among the participants. Out of 72 participants, 62 (86.11%) participants were doctors belonging to various faculty whereas the remaining 10 were from the nursing fraternity. Among the doctors, participants were the post graduate students from the various departments.

Table 1. Distribution of trainees as per their respective specialties

Subjects	Frequency N (%)
Nursing	10 (13.89)
Anesthesia	8 (11.11)
Internal Medicine	8 (11.11)
Surgery	7 (9.72)
Orthopedics	6 (8.33)
Paediatrics	6 (8.33)
Pathology	6 (8.33)
Dermatology	5 (6.94)
Gynecology and Obstetrics	4 (5.56)
Ophthalmology	3 (4.16)
Radiology	3 (4.16)
MDGP	2 (2.78)
Microbiology	2 (2.78)
ENT	1 (1.39)
Psychiatry	1 (1.39)
Total	72 (100)
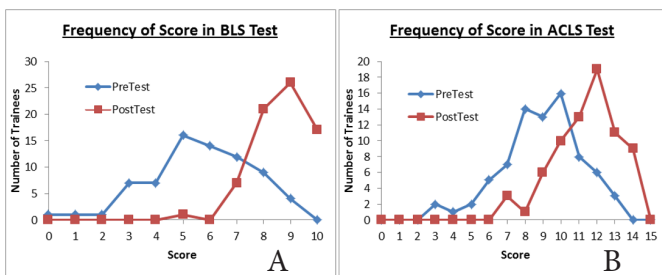
Figure 1A and 1B. Performance of Trainees in BLS and ACLS Pretest and Posttest during the training.

Table 2. Mean score and percentage obtained in the Pre-test and Post-test of BLS and ACLS.

Package	Pre-Test Score		Post-Test Score	
	BLS	ACLS	BLS	ACLS
Maximum Possible	10	15	10	15
Mean ± SD	5.67 ± 1.91	9.06 ± 2.21	8.69 ± 1.03	11.43 ± 1.77
Percentage	56.67%	60.37%	86.94%	76.20%

The performance in the pretest and posttest is depicted in the following figures 1A, 1B.

The mean score of all the participants in the pretest in BLS was 5.67 ± 1.91 out of 10 with the score ranging from 0 to 9 whereas the mean score in the posttest in BLS was 8.69 ± 1.03 and the score ranged from 5 to 10. In the pretest of BLS, the least correctly responded question was related to chest compression depth for a child with 13 (18.06%) out of 72 participants answering correctly. The most correctly responded questions were related to sudden cardiac arrest and the rate and depth for chest compressions on an adult, which had 65 (90.28%) correct responses. In the posttest of BLS, the least correctly responded question was related to the closed-loop communication with 36 (50%) correct responses, whereas all responded correctly in the question relating to rate and depth of chest compressions in an adult.

In the pretest of ACLS, the mean score was 9.06 ± 2.21 out of 15. In the posttest, the mean score was 11.43 ± 1.77 out of 15 with the score ranging from three to 13. The least correctly responded questions were related to fibrinolytic therapy in stroke patients and management of ST-elevation myocardial infarction on 12-lead ECG by Emergency medical technician, with only 19 (26.39%) correct responses. The maximum correct response was 67 (93.05%) in the question related to treatment of narrow-complex supraventricular tachycardia. In the posttest, the least correctly responded question was related to the goal for initiation of fibrinolytic therapy in stroke patients, which had 17 (23.61%) correct responses. All 72 trainees got correct responses in the question related to the treatment of narrow-complex supraventricular tachycardia. The mean scores in the tests have been shown in Table 2, in which an overall improvement of the score in the posttest can be seen as compared to the pretest.

Statistically significant increase in the mean scores were seen in both BLS [df (71) = -13.532, p < 0.001] and ACLS [df (71) = -9.956, p < 0.001] with 95% CI while comparing pretest BLS with posttest BLS, and pretest ACLS with posttest ACLS scores.

DISCUSSION

CPR is an emergency medical procedure that saves lives when done effectively and correctly.[17] The guidelines and the protocols are framed by AHA which are followed worldwide and updated regularly. Every healthcare worker is expected to have the knowledge of BLS and ACLS and implement the skills in the time of need. So, the healthcare workers need constant training and practice to have updated knowledge on BLS and ACLS skills. The effectiveness of the

training is measured by the assessment of the knowledge of the participants before and after the training as well as the application of the knowledge later in real life scenarios. There is definitely an increase in knowledge and skills of the trainee after the training but the extent to which the knowledge increases is based on various factors such as the type of the trainee, materials used, instructors, learning conditions and various other factors.

There was a significant increase in the knowledge of BLS among the participants after the training. The increase in the knowledge was 30.27% which was statistically significant. Similarly, there was significant improvement in the existing knowledge about ACLS after the training. There was 15.83% increase in knowledge of ACLS which was statistically significant. The increase in knowledge of BLS was higher as compared to ACLS. It may be due to the reason that ACLS is more complex and has more complicated steps including the use of drugs and defibrillation.

In a similar study conducted by Namibiar et al in North-Kerala, the prior knowledge in both BLS and ACLS was less than 50% in 51% of the participants.[8] Another study conducted by Alanazi et al.[11] showed a pretest score below 50% in Medical college in Saudi Arabia and Aroor et al9 showed a mean score of 4.± 1.40 (out of score 0-10) on BLS awareness level in a tertiary care setting in South India.[16] The prior knowledge of the trainee in both BLS and ACLS was found to be more than all these studies in our study. The reason may be the level of knowledge of the trainees in our study as they were working in a tertiary level hospital with 635 beds and constantly involved in resuscitation and CPR of the critically ill patients. Other factors may be because of the types of the trainees in our study, where most of them were postgraduate students of different faculties with many years of experience as a medical doctor. In the similar study by Chandran et al,[13] there was improvement of knowledge in BLS in interns with p value of 0.000. Pande et al[15] in another study showed a significantly higher score in posttest than the pretest in first year medical students with a p value of less than 0.0001. These studies have shown increase in level of knowledge after the training which support our findings.[8,9,12,13,15]

Sodhi et al[12] conducted a study to see the impact of the training of ACLS and BLS in the hospital, which showed improvement in outcome of CPR in the patient, with an increment in the rate of return of spontaneous circulation after resuscitation from 18.3% to 28.3 %. This increment was statistically as well as clinically significant. Our study has also shown improvement in the knowledge in the posttest. We expect the same result in real life scenarios in the hospital in patients. The main limitation of this study is being based on only the scores of the pre and post-test questionnaire of the trainees. BLS and ACLS require skill assessment which was not evaluated in this research. Potential biases could be recall bias while attempting the multiple-choice tests which used the same pretest and posttest questionnaire. The strength of this research lies in the fact that trainees were from multiple disciplines of healthcare while most other researches were centered amongst either group of nurses or doctors. This study also included ACLS and BLS in the same training as a complete package of CPR training so knowledge gained could be compared at one setting.

CONCLUSIONS

This study showed that there is statistically significant improvement in the knowledge of BLS and ACLS among participants after training. This highlights the importance of such training and the need to conduct them regularly.

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