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Evaluating the effectiveness of basic life support (BLS) training for healthcare workers in a tertiary care centre in Nepal

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Abstract

Introduction: Basic Life Support (BLS) guidelines provide a structured sequence of interventions that can help revive individuals with life-threatening conditions. Healthcare workers' knowledge and skills in performing BLS can mean the difference between life and death. This study aimed to evaluate healthcare professionals' pre-existing knowledge and skills regarding BLS and the effectiveness of BLS training in improving the knowledge and skills of healthcare workers.

Method: This observational study was conducted at a tertiary-level hospital in Nepal. A group of 125 participants who were trained during the BLS training course were included in our study. Data were collected through structured pre-test and post-test questionnaires supplemented by direct observation during practical skills sessions. The knowledge and skills of the participants before and after training were compared to evaluate the effectiveness of BLS training in improving the knowledge and skills of healthcare workers.

Result: The mean knowledge score of the participants was 62.88% before BLS training and 84.96% after training. The mean skills score was 59.02% before the training and 84.43% after the training. The improvement in knowledge and skills after the training was statistically significant.

Conclusion: Participants receiving BLS training show a significant improvement in both their knowledge regarding BLS and their skills in administering BLS.

Keywords: academic training; basic cardiac life support; clinical skill; healthcare workers; knowledge

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Introduction

Mortality from cardiovascular diseases accounts for 30% of all deaths globally.[1] According to the European Resuscitation Council (ERC), early resuscitation and prompt defibrillation within one to two minutes can result in more than 60% survival.[2] Basic life support (BLS) guidelines provide a structured sequence of interventions that can help revive individuals with life-threatening conditions.[3,4] Basic life support training imparts the knowledge required to recognize and manage life-threatening emergencies. The training also teaches skills such as administering high-quality chest compressions, delivering appropriate ventilations, and employing automated external defibrillators (AEDs).[5]

Basic life support plays an important role in pre-hospital care as well as in resuscitation after patients reach the hospital.[4,6] Healthcare workers' knowledge and skills in these life-saving techniques can mean the difference between life and death.[4,6,7] However, there is a paucity of literature evaluating the knowledge and skills of healthcare workers in BLS in Nepal. Despite regular BLS training sessions for healthcare workers in Nepal, there has been minimal assessment regarding the effectiveness of the training. There are research gaps in understanding the baseline knowledge and skills of Nepalese healthcare workers in BLS as well as the effectiveness of BLS training programs.

This study aimed to evaluate the pre-existing knowledge and skills of healthcare professionals regarding BLS. This study also aimed to evaluate the effectiveness of BLS training in improving the knowledge and skills of healthcare workers. Understanding the impact of these training sessions on the knowledge and skills of participants is important for refining future training programs and providing insights to optimize BLS training strategies.

Method

This observational study was conducted in December 2024 at Bharatpur Hospital, which is a tertiary-level hospital located in Bharatpur, Chitwan, Nepal. The study was conducted after ethical approval was obtained from the Institutional Review Committee (IRC) of Bharatpur Hospital (Ref: 081/82-021) before commencing the study.

The participants were selected for BLS training, with a focus on staff directly involved in patient care within the targeted departments. The participants receiving BLS training included different healthcare professionals, including medical officers (MOs), nurses, and paramedics from the emergency ward, Intensive Care Unit (ICU), operation theatre, and post-operative wards. Healthcare professionals from these departments were chosen for BLS training because of their crucial role in emergency patient care. A group of 125 participants was trained during the BLS training course. All the participants receiving the BLS training were included in our study. Written informed consent was obtained before enrolment in the study.

Data were collected through structured pre-test and post-test questionnaires supplemented by direct observation during practical skills sessions. A pre-defined validated questionnaire with 25 questions based on the BLS training manual by American Heart Association (AHA) was used to assess the level of knowledge of BLS.[8,9] These questions were multiple-choice questions, and participants were given a score of one for each correct answer and a score of zero for a wrong answer or a missed question. Therefore, the total score for knowledge was 25. Skills were evaluated by BLS trainers via direct observation and were graded as satisfactory (score of 3), needing improvement (score of 2), or unsatisfactory (score of 1). A total of 17 skills were assessed, so the total score for skills was 51.

A pre-test was performed in which both the knowledge and skills of the participants were assessed by the BLS trainers before they received the BLS training. The pre-test scores were recorded, and then, a training program on BLS was conducted, which was a two-day program. The participants were divided into six groups, and the training was conducted according to the AHA's BLS training manual. A post-test was again conducted at the end of the program to assess the knowledge and skills of the participants after receiving the BLS training, and the scores were recorded.

The data were entered into Microsoft Excel 2021, and data analysis was performed with Microsoft Excel 2021 and Epi Info 7. The pre-test and post-test knowledge scores were compared using the paired t-test. Similarly, the pre-test and post-test skills scores were obtained using descriptive statistics.

Result

The total number of participants included in our study was 125. Among the total participants, 40(32%) were medical officers, 50(40%) were nurses, and 35(28%) were paramedics. There were 30(24%) participants working in the emergency ward, 40(32%) participants working in the ICU, 30(24%) participants working in the operation theatre, and 25(20%) participants working in the post-operative ward.

The mean knowledge score achieved by the participants in the pre-test before receiving the BLS training was 15.72±1.92 out of a total score of 25. After the training, the participants achieved a mean knowledge score of 21.24±1.05, Table 1.

Table 1. Comparison of scores achieved by participants before and after BLS training

Knowledge		
Test	**Mean score**	**Percentage**
Pre-test	15.72±1.92	62.88%
Post-test	21.24±1.05	84.96%
Skills		
Test	**Mean score**	**Percentage**
Pre-test	30.10±7.36	59.02%
Post-test	43.06±5.06	84.43%

The mean skills score achieved by the participants in the pre-test before receiving the BLS training was 30.10±7.36 out of a total score of 51. After the training, the participants achieved a mean skill score of 43.06±5.06, Table 1. On analysis of scores achieved by different groups of participants, the mean score obtained by the medical officer in the knowledge pretest was 15.76±2.04, the Nurse 15.59±1.84, and the Paramedic 15.85±1.93. In the skill pre-test, the mean score of the medical officer was 32.93±7.93, nurse was 29.50±7.02, and that of the paramedic was 27.71±6.23, Table 2.

Table 2. Comparison of scores achieved by different groups of participants before BLS training

Pre-test Knowledge scores		
Group	**Mean**	**Percentage**
Medical officer	15.76±2.04	63.04%
Nurse	15.59±1.84	62.36%
Paramedic	15.85±1.93	63.40%
Pre-test Skills scores		
Group	**Mean**	**Percentage**
Medical officer	32.93±7.93	64.57%
Nurse	29.50±7.02	57.84%
Paramedic	27.71±6.23	54.33%

Table 3. Comparison of scores achieved by different groups of participants after BLS training

Post-test Knowledge scores		
Group	**Mean**	**Percentage**
Medical officer	21.31±1.23	85.24%
Nurse	21.12±0.87	84.48%
Paramedic	21.33±1.07	85.32%
Post-test Skills scores		
Group	**Mean**	**Percentage**
Medical officer	43.15±5.06	84.60%
Nurse	42.46±5.13	83.25%
Paramedic	43.83±4.97	85.94%

The mean score obtained by the medical officer in the knowledge post was 21.31±1.23, the nurse 21.12±0.87, and the Paramedic 21.33±1.07. In skill pre-test, the mean score of medical officers was 43.15±5.06, nurses was 42.46±5.13, and that of paramedics was 43.83±4.97, Table 3.

Discussion

Basic life support serves as a bridge between life-threatening emergencies and definitive medical care.[10] The ability to recognize cardiac arrest early and effectively administer CPR, which is a fundamental aspect of BLS, can mean the difference between life and death.[4] BLS is a critical component of emergency care, especially during life-threatening conditions when time is a vital factor. Providing individuals with BLS knowledge and skills can help save lives and improve the quality of care during emergencies.[10] Healthcare professionals are expected to have the knowledge and skills required to resuscitate patients during life-threatening emergencies. They frequently face life-threatening situations in their daily practice as well.[7] However, low confidence among medical students in performing BLS has been reported in Europe.[11] Poor training among undergraduate medical students has also been reported in the UK and Poland.[12,13] Inadequate knowledge of BLS has been reported in Switzerland and Pakistan.[14,15] Data from India also suggest that awareness of BLS among medical, dental, and homeopathic students, doctors, and nurses is very poor.[16] Some healthcare professionals have never formally received training regarding BLS.[12,13] Even those who have received training regarding BLS may not retain their knowledge unless it is periodically revised.[12,13]

The present study included diverse healthcare professionals, including medical officers, nurses, and paramedics. This study draws attention to healthcare professionals' knowledge and skills regarding Basic Life Support (BLS). The study population included 40(32%) medical officers, 50(40%) nurses, and 35(28%) paramedics. This distribution reflects a comprehensive range of medical roles, indicating varied preparedness levels among the participants. The importance of understanding the diverse factors influencing BLS knowledge has been emphasized by another study done among professional nurses and nursing students as well, which makes this study relevant for understanding the preparedness levels of different healthcare professionals.[17]

The knowledge scores achieved by different groups of participants before receiving the BLS training were almost similar. This suggests that foundational BLS knowledge may be relatively uniform across these groups. However, difference in the pre-existing skills score of the different groups of participants. This finding probably shows that paramedics, despite their role in emergency care, may have fewer opportunities to practice specific BLS skills than medical officers do. This finding emphasizes the need for targeted interventions for specific professional groups, in line with recommendations from a previous study conducted in Italy.[18] These disparities also emphasize the need for training programs that address the distinct needs and roles of different healthcare professionals.

After receiving the BLS training, the knowledge and skill scores of all participants increased with no notable difference between the groups of healthcare workers. This finding shows that BLS training can help achieve the same level of knowledge and skills in a diverse group of healthcare professionals. These results show that BLS training can bridge the gap between different groups in terms of both knowledge and skills. Therefore, well-structured and consistent training programs can help ensure that all healthcare professionals, regardless of their specialty, have a uniform level of preparedness when faced with life-threatening emergencies. This finding supports the assumption that BLS training significantly impacts the knowledge of participants, which is similar to the observations of another study from Nepal.[19] The findings also align with those of another study conducted among nurses, suggesting that the program can affect the practical aspects of BLS.[20] The positive impact on knowledge and skills demonstrated in our study aligns with findings from other parts of the world, emphasizing the global relevance of BLS education. As seen in our study, BLS training significantly enhances both the knowledge and skills of healthcare professionals, highlighting the importance of well-structured, ongoing training programs.

While our study revealed significant improvements in the participants' ability to perform BLS after training, it is essential to contextualize these findings within global trends. Additionally, it is important to recognize the limitations of knowledge and skill retention over time. The findings from other studies done among nurses regarding BLS knowledge show that the knowledge decays over time, which emphasizes the importance of regular training.[21,22] While this study demonstrated immediate post-training improvements, without ongoing training, the skills may not be retained. Therefore, we should also consider the need for regular refresher courses to reinforce critical skills and knowledge.

This study underscores the importance of Basic Life Support (BLS) training in improving healthcare workers' knowledge and skills, which significantly impacts their ability to respond to emergencies. Regular BLS training programs not only are beneficial to healthcare workers but can also profoundly improve patient outcomes, reduce mortality, and enhance overall preparedness to handle emergencies. Given these positive results, regular BLS training programs should be implemented across healthcare systems, and future studies should focus on long-term retention and the efficacy of digital learning tools. Healthcare systems that invest in regular, high-quality BLS training programs can improve the immediate response to emergencies and reduce the incidence of preventable deaths in the community. This is particularly true in low-resource settings where healthcare workers may face additional barriers, such as limited access to equipment, lack of regular training opportunities, and high patient volumes.

The value of BLS training extends beyond healthcare workers to the general public. Widespread community education about BLS can be an essential step toward improving overall survival rates from life-threatening conditions. We recommend that healthcare institutions adopt a policy of frequent BLS training for all healthcare workers, not limited to physicians but extending to nurses, paramedics, and support staff. Training programs should be tailored to address the specific roles and needs of each healthcare worker group, ensuring that all professionals, regardless of their specialty, receive the targeted education necessary for optimal emergency response. Furthermore, there should be an emphasis on the integration of BLS training into medical education from an early stage, ensuring that medical students, nursing students, and other healthcare trainees acquire these skills before they begin clinical practice. Regular assessment and a system for tracking BLS certification could also help ensure that staff maintain their competence in life-saving interventions.

This study provides valuable insights into the effectiveness of Basic Life Support (BLS) training for healthcare professionals. However, several limitations must be acknowledged. This study was conducted at a single tertiary care centre in Nepal, limiting the generalizability of the findings. Healthcare settings vary widely in terms of resources, infrastructure, and patient population. Further studies should include multi-centre data from diverse geographical locations to assess the broader applicability of BLS training effectiveness. Additionally, the lack of an extended follow-up limits the assessment of the long-term retention of the knowledge and skills gained after BLS training. Future studies with extended follow-up periods could assess whether improvements in knowledge and skills are maintained over weeks, months, or even years. We also did not assess the relationship between BLS knowledge and years of experience. Future research should consider addressing these limitations to provide a more robust understanding of BLS education and preparedness among healthcare professionals. The training participants were staff directly involved in patient care, which may introduce selection bias. Healthcare workers who are already more confident in their BLS skills or have a particular interest in emergency care may have been more likely to volunteer for the training, resulting in a skewed sample. Conversely,

those with less experience or interest in BLS may not have participated, which could affect the generalizability of the findings. A more random selection method could help mitigate this potential bias and provide a more representative sample of healthcare professionals. While the study assessed knowledge and skills, it did not evaluate participants' confidence levels in performing BLS techniques after the training. Confidence is an important factor that can influence the ability of healthcare workers to apply their skills effectively in real-life emergencies. Future studies could include measures of self-confidence or perceived competence, which might offer additional insights into the effectiveness of training.

Conclusion

Participants receiving BLS training show a significant improvement in both their knowledge regarding BLS and their skills in administering BLS.

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Conflict of interest

None

Author's contribution

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