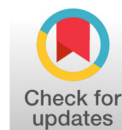




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## Knowledge of Advanced and Basic Cardiac Life Support among Health Care Workers in China: A Comprehensive Study

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**Abstract | Background:** Cardiovascular emergencies, particularly sudden cardiac arrest, represent a major global health threat requiring rapid and competent clinical responses. The proficiency of frontline health care workers in Advanced Cardiac Life Support (ACLS) and Basic Cardiac Life Support (BCLS) is crucial for improving patient outcomes. This study focuses on health care workers in China, aiming to evaluate their preparedness in ACLS and BCLS and to address gaps in the existing regional literature. **Materials and Methods:** A cross-sectional survey was conducted between August 2023 and November 2023 among health care workers in selected health care settings in China, involving 100 participants. Data were collected using a Google Form-based questionnaire that assessed socio-demographic characteristics and knowledge related to ACLS and BCLS. A structured scoring system categorized participants' knowledge levels into poor, fair, good, and very good. Data analysis was performed using Epi Info version 7 software, with results presented as frequencies and percentages. **Results:** The findings demonstrated generally good overall knowledge of ACLS and BCLS among participants, with stronger performance observed in BCLS-related components. However, variability in knowledge levels highlighted specific areas requiring improvement. Notable knowledge gaps were identified in the use of automated external defibrillators (AEDs), the role of medications in ACLS, and the importance of early defibrillation. Awareness regarding the need for continuous retraining was high, emphasizing the value of ongoing education. Additional gaps were observed in ACLS-related areas, including synchronized cardioversion, therapeutic hypothermia, and the management of stroke and acute coronary syndrome. **Conclusion:** Although health care workers demonstrated commendable knowledge of ACLS and BCLS, targeted educational interventions are necessary to address identified deficiencies. Emphasis on AED utilization, medication roles, early defibrillation, and continuous retraining may enhance emergency preparedness. Focused attention on ACLS components such as synchronized cardioversion and therapeutic hypothermia is recommended. This study provides valuable insights to inform policy and practice, supporting the need for continuous education initiatives within the Chinese health care context.

**Keywords:** Cardiovascular Emergencies, Advanced Cardiac Life Support (ACLS), Basic Cardiac Life Support (BCLS), Health Care Workers, Regional Disparities, Emergency Response, Continuous Retraining, District Kinnaur, Himachal Pradesh, India

### INTRODUCTION

In the realm of healthcare, the ability of frontline health care workers to adeptly respond to emergencies is paramount. Particularly crucial in this context is their proficiency in Advanced Cardiac Life Support (ACLS) and Basic Cardiac Life Support (BCLS). District Kinnaur, nestled in the picturesque landscapes of Himachal

Pradesh, India, becomes the focus of our inquiry, seeking to unravel the preparedness of its healthcare workforce in these critical life-saving interventions.

Cardiovascular emergencies, including sudden cardiac arrests, represent a significant global health concern, necessitating prompt and effective interventions for favorable outcomes. The American Heart Association

(AHA) emphasizes the pivotal role of ACLS in managing complex cardiac emergencies, while BCLS serves as the fundamental foundation for initial response in critical situations [1]. Indian healthcare literature underscores the need for enhanced training and awareness in advanced and basic life support. Studies by Kapoor *et al.* [1] in Northern India and Singh *et al.* [2] in rural settings have illuminated gaps in CPR knowledge among medical professionals, highlighting the urgency for targeted interventions [2-3]. Additionally, Bhanu *et al.* [4] accentuated the variability in CPR knowledge among healthcare professionals in different Indian states, underscoring the importance of regional assessments [4].

The diverse healthcare landscape in India often results in regional variations in the quality of training and preparedness of healthcare workers. Therefore, a focused evaluation of ACLS and BCLS knowledge among health care workers in District Kinnaur is imperative. This research aims to fill a crucial gap in the literature by providing a comprehensive assessment of the preparedness of health care professionals in this unique regional context.

### Objectives of the Study

To evaluate the Knowledge of Advanced Cardiac Life Support (ACLS) and the Basic Cardiac Life Support (BCLS) among Health Care workers employed in the District Kinnaur, Himachal Pradesh.

## MATERIAL AND METHODS

- **Research Approach:** Descriptive
- **Research Design:** Cross-sectional survey design
- **Study Area:** District Kinnaur, Himachal Pradesh
- **Study Duration:** Between August 2023 to November 2023

### Study Population

All Health Care workers employed in District Kinnaur, Himachal Pradesh for 12 months or more.

### Sample Size

100 Health Care workers assuming 50% have adequate knowledge regarding Advanced Cardiac Life Support (ACLS) and the Basic Cardiac Life Support (BCLS), 10% absolute error, 95% confidence level, and 5% non-response rate.

### Sampling Technique

Convenience and snowball sampling technique.

### Study Tool

A google form questionnaire consisting of questions regarding socio-demography and Advanced Cardiac Life Support (ACLS) and the Basic Cardiac Life Support (BCLS) was created. The questionnaire was initially pre-tested on a small number of Health Care workers to identify any difficulty in understanding by the respondents.

### Description of Tool

**Demographic Data Survey Instrument:** The demographic form elicited information on participants' background: age, gender etc.

### Questionnaire

The questionnaire contains 20 structured questions regarding knowledge about Advanced Cardiac Life Support (ACLS) and the Basic Cardiac Life Support (BCLS). One mark was given for each correct answer and zero for incorrect answer. The maximum score was 20 and minimum score was zero. Scoring was done on the basis of marks as >80% (16-20) = very good, 60-79% (12-15) = Good, 41-59% (8-11) = Fair, <40% (< 8) = poor.

### Validity of Tool

By the experts in this field

### Inclusive Criteria

who were willing to participate in the study?

### Exclusion Criteria

who were not willing to participate in the study?

### Data Collection

Data was collected under the guidance of supervisors. The google form questionnaire was circulated via online modes like e-mail and social media platforms like Whatsapp groups, Facebook, Instagram and LinkedIn among Health Care workers working in the District Kinnaur, Himachal Pradesh till the 100 responses were collected. Responses were then recorded in a Google Excel spreadsheet.

### Data Analysis

Data was collected and entered in Microsoft excel spreadsheet, cleaned for errors and analyzed with Epi Info V7 Software with appropriate statistical test in terms of frequencies and percentage.

### Ethical Considerations

Participants confidentiality and anonymity was maintained.

## RESULTS

The present study was cross sectional descriptive study carried out to evaluate knowledge of Advanced Cardiac Life Support (ACLS) and the Basic Cardiac Life Support (BCLS) among 100 Health Care workers employed in the District Kinnaur, Himachal Pradesh.

In the present study, 23 study participants had very good knowledge (16-20 marks) regarding Advanced Cardiac Life Support (ACLS) and the Basic Cardiac Life Support (BCLS), 35 had good knowledge (12-15 marks), 24 had fair knowledge (8-11 marks) and 18 had poor knowledge (<8 marks).

Table1: Responses to the questions regarding Advanced Cardiac Life Support (ACLS) and the Basic Cardiac Life Support (BCLS)

No.	Statements	Frequency of Correct Responses
1	What does BCLS stand for, and why is it essential in healthcare?	76
2	Outline the basic steps of the BCLS algorithm.	65
3	Describe the correct technique for performing chest compressions on an adult during BCLS.	67
4	What is the recommended compression depth for adult chest compressions in BCLS?	65
5	When and how should automated external defibrillators (AEDs) be used in the context of BCLS?	52
6	Explain the significance of early defibrillation in BCLS.	51
7	Describe the correct hand positioning for performing chest compressions on an infant during BCLS.	58
8	What modifications are made when performing BCLS on a child compared to an adult?	54
9	When is rescue breathing indicated in the BCLS algorithm, and what is the recommended ventilation rate?	52
10	How do you assess responsiveness and breathing in a victim during the initial steps of BCLS?	64
11	Define ACLS and its role in the management of cardiac emergencies.	68
12	Outline the ACLS algorithms for ventricular fibrillation and pulseless ventricular tachycardia.	59
13	Explain the use of medications like epinephrine and amiodarone in ACLS.	51
14	What are the key differences in managing bradycardia and tachycardia in ACLS?	48
15	Describe the proper technique for intubation during ACLS.	50
16	When is synchronized cardioversion used in ACLS, and how is it performed?	44
17	Discuss the role of therapeutic hypothermia in post-cardiac arrest care during ACLS.	37
18	What actions are taken in ACLS for a patient with a suspected stroke or acute coronary syndrome?	36
19	How is the reversible cause of cardiac arrest addressed in the ACLS algorithm?	42
20	Explain the importance of effective team dynamics and communication during ACLS scenarios.	58

Table 2: Knowledge regarding Advanced Cardiac Life Support (ACLS) and the Basic Cardiac Life Support (BCLS) among study participants

Category (Marks)	Frequency (n = 100)
V. Good (16-20)	23
Good (12-15)	35
Fair(8-11)	24
Poor(<8)	18

## DISCUSSION

The cross-sectional descriptive study assessing the knowledge of Advanced Cardiac Life Support (ACLS) and Basic Cardiac Life Support (BCLS) among health care workers in District Kinnaur, Himachal Pradesh, unraveled multifaceted insights into the preparedness of frontline responders for cardiac emergencies. The study revealed commendable strengths in certain areas and identified specific domains requiring targeted attention and improvement.

A substantial portion of participants exhibited commendable knowledge, particularly in BCLS-related aspects. Noteworthy were the responses pertaining to the essential nature of BCLS in healthcare, the basic steps of the BCLS algorithm, and the correct technique for performing chest compressions on adults. These findings align with studies conducted elsewhere in India, emphasizing the foundational importance of BCLS in emergency scenarios [2-7].

While the overall knowledge was promising, variability was observed in responses related to certain aspects of BCLS and ACLS. Notably, the use of automated external defibrillators (AEDs) in the context of BCLS and the role of medications like epinephrine and amiodarone in ACLS garnered responses indicative of lower proficiency. This highlights specific areas that could benefit from targeted educational interventions [8-11].

The study identified a knowledge gap regarding the significance of early defibrillation in both BCLS and ACLS scenarios. Early defibrillation is a critical intervention that significantly influences survival rates in cardiac emergencies [12-15]. Addressing this gap through

targeted training programs could substantially enhance the preparedness of health care workers in District Kinnaur.

While a considerable proportion of participants demonstrated awareness of the need for regular retraining and certification in BCLS and ACLS, the study findings underscore the importance of continuous educational initiatives. Regular updates in guidelines and protocols necessitate ongoing retraining to ensure that healthcare providers are equipped with the latest evidence-based practices [1,16-17].

Despite the overall positive findings, specific areas presented opportunities for improvement, particularly in ACLS-related aspects. Addressing knowledge gaps related to synchronized cardioversion, therapeutic hypothermia, and actions for suspected stroke or acute coronary syndrome in ACLS scenarios could enhance the comprehensive preparedness of health care workers [18-21].

The study's outcomes bear implications for both clinical practice and policy development. Strengthening training programs, with a focus on identified knowledge gaps, is vital. Additionally, healthcare institutions and policymakers should consider instituting regular, mandatory retraining sessions to maintain the proficiency of health care workers in ACLS and BCLS [22-23].

## Study Limitations

While the study contributes valuable insights, it is essential to acknowledge certain limitations. The use of convenience and snowball sampling methods may introduce selection bias, and the findings may not be entirely generalizable.

Additionally, self-reported knowledge in a questionnaire may not wholly reflect practical skills in real-world scenarios.

## CONCLUSIONS

In conclusion, this study sets the stage for targeted interventions in District Kinnaur, emphasizing the need for continuous training and improvement initiatives to bolster the emergency response capabilities of health care workers in the region.

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