

Community Preparedness and Response to Life-Threatening Emergencies: A Quasi-Experimental Study

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Abstract

Life-threatening emergencies (LTEs), including cardiac arrest, drowning, and electric shock incidents, need immediate and effective first aid response. Community-based training programs are essential in preparing individuals with the knowledge and skills to manage such emergencies, thus reducing prehospital morbidity and mortality. To assess the effectiveness of basic life support (BLS) training on the community's knowledge and practical skills in responding to LTEs in a rural setting in Khyber Pakhtunkhwa, Pakistan. A quasi-experimental study with a pre-test and post-test design was conducted from September to December in Karachi, Pakistan. Thirty male participants aged 18 and above were conveniently sampled and equally divided into an intervention group of 15 and a control group of 15. The intervention group received a two-hour for one-week BLS training program consisting of interactive lectures, practical demonstrations, and role-playing exercises. The knowledge and practical skills pre- and post-intervention were assessed using an adopted questionnaire and an observational checklist. Data analysis was carried out in SPSS version 26. Baseline Both groups were found to have no significant difference in knowledge, $p = 0.51$ and practical skills, $p = 0.62$. The intervention group, following training, was found to be significantly improved as compared to the control group regarding knowledge, 9.2 ± 0.8 vs. 4.8 ± 1.3 , $p < 0.001$, and practical skills, median score: 8, IQR: 7–9 vs. 2, IQR: 1–3, $p < 0.001$. Community-based BLS training significantly boosts knowledge and the practical skills with which to effectively manage LTEs. This article highlights the potential of such interventions in community preparation strategies to build better emergency responses and outcomes.

Introduction:

Life-threatening Emergencies (LTE), are medical emergencies that pose an immediate threat to a person's life, and their intervention requires urgent treatment to prevent death or serious harm. These situations require urgent treatment, otherwise death or major harm is at risk. Emergencies can happen anywhere at any time. They necessitate immediate attention. Higher awareness about daily emergencies to be managed by BLS training is the need, especially to promote tourism [1]. Management of LTE patients in urban and rural communities remains a great challenge that heavily impacts the pre-hospital mortality and morbidity outcome. For this reason, basic emergency care should be provided at every level of the health delivery system [2]. BLS is the first or foundational level of medical care given to victims of life-threatening illnesses or injuries before full medical care is accessible at a hospital [3]. This means that during emergencies, the

layperson must be empowered with the knowledge and skills to perform BLS, since such emergencies may occur in areas where medical practitioners or health service providers are not available. This is an important requirement for public health preparedness and response: it provides life-saving resources and support to vulnerable populations before, during, and after emergencies [4]. Community-based service providers play a crucial role in making it possible for people with disabilities and chronic health conditions to be involved in disaster risk reduction at the community level. However, there is not much known about the inclusion of emergency preparedness in the already existing community health care, disability, and rehabilitation services [5]. It is crucial that the theoretical and practical skill levels of primary health care (PHC) physicians are standardized so that equitable emergency care provision across different geographical areas is made possible [6]. Cardiac arrest and failure to breathe are life-threatening medical conditions that can result in death if not managed promptly. Proper response to such emergencies depends on the knowledge of relevant techniques that should be followed. BLS teaches fundamental techniques for saving victims from various accidents and daily disasters [7]. Cardiovascular diseases (CVDs), which encompass strokes and heart attacks, remain the most common cause of death worldwide, with an estimated 17.5 million deaths annually. Out-of-hospital cardiac arrest is a significant public health problem that affects all age groups, accounting for about 70% of high-risk mortality cases outside hospital settings [8]. Cardiac arrest continues to be one of the major public health issues: more than half a million out-of-hospital cardiac arrests are reported annually in the United States and Europe. Survival rates remain dismally low, averaging less than 10%. One study in Saudi Arabia enrolled 96 adults with OHCA, where the high mortality rate of 95.8% was contributed by the low rate of bystander-performed cardiopulmonary resuscitation (CPR). Evidence indicates that immediate CPR can increase a victim's chance of survival by two- to three-fold [9]. Despite its importance, many witnesses to OHCA fail to perform CPR due to insufficient knowledge and training, as observed in studies across diverse countries [10]. Although BLS is instrumental in saving lives, a critical gap exists in public awareness, knowledge, and attitudes regarding BLS in many regions. The lack of awareness and confidence among bystanders often hampers the prompt initiation of BLS, which is critical in determining outcomes for cardiac arrest cases [11]. Improving survival rates and reducing preventable deaths depends on filling these gaps with widespread education and training in BLS.

Methodology:

A quasi-experimental study with a pre-test and post-test approach was conducted in a community in Karachi Pakistan from September to December for assessing the effectiveness of BLS on the community response to LTE. Participants less than 18 years are excluded from the study. Through convenient sampling, 30 participants were recruited. All these participants satisfied the inclusion criteria: people with no prior formal first aid training and not being healthcare professionals but willing to participate in the study. Participants were divided into two groups: an intervention group of 15 participants who's received first aid training, and a control group of 15 participants who's not receive any training during the study period. The training program was span two hours for one-week and include interactive lectures, practical demonstrations, and role-playing exercises focusing on essential first aid skills such as CPR, handling drowning victims, and managing electric shock incidents. Both groups give a pre-test by using an adopted questionnaire [12] to assess their baseline knowledge and attitudes regarding BLS, along with an observational checklist to assess their practical skills in simulated scenarios. After the training session, a post-test was conducted for both groups using the same tools to measure changes in their knowledge and skills. Data were analyzed using SPSS version 26. Continuous variables were assessed for normality. For the normally distributed variables, the mean and standard deviation were calculated,

while in non-normally distributed variables, median and IQR were used for summary. The categorical variables are expressed as frequencies and percentage. For the comparison within the intervention group at the pre-test and post-test, paired t-test or Wilcoxon signed rank test was used. When a comparison between the intervention group and the control group, the independent t-test and the Mann-Whitney U test were utilized. Chi-square or Fisher's exact test was used appropriately to analyze the relationship of demographic variables with outcomes. The statistical significance was taken at $p < 0.05$, and the effect size was calculated in order to find out how much the intervention has affected. Institutional Review Board (IRB) had approved the study, and an informed written consent was ensured from all participants. Confidentiality and anonymity were maintained while conducting the study. The study is anticipated to demonstrate a significant improvement in the intervention group's first aid knowledge and practical skills, highlighting the importance of community-based training programs for enhancing emergency preparedness.

Result:

A total of 30 males were involved in the study, equally divided between the intervention and control groups: $n = 15$ in the intervention group and $n = 15$ in the control group. The mean age of the participants was 34.2 ± 7.8 years. There were no significant differences in the demographic characteristics between the groups. Table 1 summarizes the demographic characteristics. Most participants 50% ($n=15$) had secondary-level education, 16.7% ($n=5$) had primary and 33.3% ($n=10$) had higher secondary education, while 63.3% ($n=19$) were employed and 36.7% ($n=11$) were unemployed.

Table 01

Characteristics	Interventional group (n=15)	Control group (n=15)	Total n=30
Age			
Mean	34.6	33.8	34.2
Level of education			
Primary	3 (20%)	2 (13.3%)	5 (16.7%)
Secondary	7 (46.7%)	8 (53.3%)	15 (50%)
Higher secondary	5 (33.3%)	5 (33.3%)	10 (33.3%)
Employment status			
Employed	10 (66.6%)	9 (60%)	19 (63.3%)
Unemployed	5 (33.3%)	6 (40%)	11 (36.7%)

At baseline, the scores for knowledge and practical skills related to BLS were the same for both the intervention and control groups, and there were no statistically significant differences. The mean pre-test knowledge scores were 4.8 ± 1.2 in the intervention group and 4.6 ± 1.1 in the control group ($p = 0.51$). Practical skills had a median score of 2 (IQR: 1–3) for the intervention group and 2 (IQR: 1–2) for the control group ($p = 0.62$). After the intervention training, the intervention group's both knowledge and practical skills scores improved significantly. Post-training knowledge scores of intervention subjects reached 9.2 ± 0.8 in comparison to a mean score of 4.8 ± 1.3 in the control group ($p < 0.001$). Similarly, the practical skills in the intervention group increased with a median score of 8 (IQR: 7–9), while the control group's median remained at 2 (IQR: 1–3) with no significant change. The findings are presented in Table 2.

Table 02

Variables	Group	Pre-test	Post-test	p-value
Knowledge score	Intervention	4.8 ± 1.3	9.2±0.8	<0.001
	Control	4.6±1.1	4.8±1.3	0.58
Practical skill	Intervention	2 (IQR: 1-3)	8 (IQR: 7-9)	<0.001
	Control	2 (IQR: 1-2)	2 (IQR: 1-3)	0.71

Discussion:

This quasi-experimental study points out the significant positive impact that structured BLS training impacts community preparedness and response to life-threatening emergencies as showed by the marked improvement in the knowledge and skills base of participants postintervention. The cross-sectional study with 740 participants showed very poor BLS knowledge, at a mean of 5.3 out of 15 with SD ±2.8. Though earlier training, new courses, and exposure to CPR showed significant knowledge enhancement ($p < 0.001$), overall awareness remained limited, even though the students felt a favorable attitude toward the training in BLS [12]. In contrast, this quasi-experimental study actually presented the effectiveness of focused interventions by showing that there was a post training significant increment in both theoretical knowledge and practical skills regarding life-threatening emergencies. Though the cross-sectional study reported gaps and underlined the need for public education, this study was a basis for providing evidence as to how structured training programs can practically address these deficiencies. In addition, the findings of this quasi-experimental study underscore the critical role of structured BLS training in improving community response to life-threatening emergencies, consistent with the importance of effective prehospital interventions like Triage as emphasized in the study above. Whereas Triage is the rapid assessment and prioritization aimed at optimizing the outcome of the patient within the emergency medical services (EMS) [13], the current study extends the concept to layperson preparedness, showing that targeted BLS training equips individuals with necessary skills to stabilize patients before EMS arrival, enhancing survival rates and reducing complications. Both studies point to the importance of timely and informed action in emergency care. Furthermore, this quasi-experimental study results point to the significance of training community members in BLS to enhance their response to life-threatening emergencies. Similarly, the referred study points to the enhancement of prehospital emergency care for patients with advanced incurable diseases through training of EPs in palliative care, communication, and caregiver support [14]. While both studies focus on improving outcomes through education and skill development, this study addresses equipping laypersons to handle immediate emergencies, whereas the referenced study focuses on professional-level competencies in specialized care. Both underscore the vital role of targeted training in enhancing prehospital care and patient outcomes. Furthermore, this quasi-experimental study shows the tremendous impact of focused BLS training on improving community preparedness for life-threatening emergencies, as compared to another study, which states that interactive emergency training may have uncertain effects on patient outcomes, adherence to protocols, or clinical practice [15]. Even though the evidence from the review is of low certainty, this study clearly presents evidence of increased knowledge and skills through focused community-level interventions. Moreover, our study aligns with the study referenced above, showing the efficacy of focused training in building knowledge and readiness. Although this study was focused on training to enhance community response to life-threatening emergencies, the referenced study showed significant improvement in CHWs' knowledge regarding water breakage without labor after training [16]. Both studies show statistically significant pre- to post-training gains, underlining the transformative effect of educational interventions. Additionally, this study demonstrates the effectiveness of BLS training in enhancing community preparedness for emergencies, while the referenced cross-sectional study emphasizes the centrality of knowledge,

attitudes, and practices in responding to COVID-19 [16]. Education and awareness are thus highlighted as being important for public readiness and safety in both studies but in different contexts. Besides that, a study of 423 residents of a community showed preparedness voids as 57% reported little preparedness and 76% were unaware of residential emergency systems [18]. In contrast, this quasi-experimental study showed significant improvements in community preparedness and response to emergencies highlighting the radical improvement that occurred as a result of structured BLS training to cover such deficiencies. The out-of-hospital cardiac arrest (EPOC) study emphasizes the strategic improvement of emergency response systems regarding out-of-hospital cardiac arrest, a critical life-threatening emergency and a leading cause of death [19]. Likewise, this quasi-experimental study points out how targeted BLS training empowers communities to adequately respond to emergencies such as cardiac arrest, improves preparedness, and survival outcome. Furthermore, the occurrence of disasters such as road accidents necessitates adequate community-based intervention to minimize hazards to health and well-being. The cited research focuses on the major impact of directed first aid education on enhancing preparedness for and response to disaster [20]. Our study also underscores that equipping member of the community with skills to respond to life-threatening emergencies such as cardiac arrest has an important goal: to minimize morbidity and mortality through knowledge and preparedness.

Conclusion:

Community-based BLS training significantly boosts knowledge and the practical skills with which to effectively manage LTEs. This article highlights the potential of such interventions in community preparation strategies to build better emergency responses and outcomes.

Conflict of interest:

The authors declare no conflict of interest.

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References:

1. Suindrayasa IM, Suarningsih NK, Manangkot MV. The influence of basic life support training on the level of public knowledge about emergency handling in Tanah Lot tourist area in Bali. *Enfermeria Clinica*. 2020 Dec 1;30:57-9.
2. Aldhakhri A, Can G. Evaluation of Public Awareness, Knowledge and Attitudes towards Basic Life Support among Non-Medical, Adult population in Muscat City, Oman: Cross-Sectional Study. *medRxiv*. 2020 May 22:2020-05.
3. Sadeghi-Bazargani H, Amir-Behghadami M, Gholizadeh M, Janati A, Rahmani F. Preparedness of non-hospital health centers to manage patients with life-threatening emergency conditions: findings from a qualitative study. *BMC Health Services Research*. 2020 Dec; 20:1-1.
4. Holt JB, Matthews KA, Lu H, Wang Y, LeClercq JM, Greenlund KJ, Thomas CW. Small area estimates of populations with chronic conditions for community preparedness for public health emergencies. *American journal of public health*. 2019 Sep;109(S4): S325-31.

5. Subramaniam P, Villeneuve M. Advancing emergency preparedness for people with disabilities and chronic health conditions in the community: a scoping review. *Disability and rehabilitation*. 2020 Oct 22;42(22):3256-64.
6. Martínez JA, Delgado RC, Fernández EF, González PA. Self-perception of theoretical knowledge and practical skills by primary health care physicians in life-threatening emergencies. *Prehospital and Disaster Medicine*. 2018 Oct;33(5):508-18.
7. Aditya RS, Solikhah FK, Kurniawan SB. Teenager response to the conditions of basic level emergency: A phenomenology study. *Indian Journal of Public Health*. 2019 Sep;10(1):170.
8. Fariduddina MN, Siau CS. Knowledge, attitude and perceptions towards basic life support training among student teachers in a Malaysian University. *The European Journal of Social & Behavioural Sciences*. 2021 Apr 30.
9. Gaafar RM, Khan AS, Elmorsy S. Knowledge and attitude of young population toward CPR training, results from largest training session in an official attempt to enter Guinness Book of Records: A cross-sectional study from Saudi Arabia. *Journal of Family Medicine and Primary Care*. 2022 Feb 1;11(2):531-6.
10. Abbas HA, Khudari SY, Almalki RH, Abed RT, Sait SA, Sulaiman AA. Public knowledge and attitude toward basic life support in Jeddah, Saudi Arabia. *Int J Community Med Public Health*. 2021 Mar;8:1082-90.
11. Almutairi AH, Alhassan SA, Alsuwayyid RY, Alaskar AA, Almutairi FS, Alsaid AF, Alharbi YA, Almazrou MA, Alotaibi KF. Awareness, Knowledge, and Attitudes Regarding Basic Life Support Among the General Population in the Al-Majma'ah Region, Saudi Arabia. *Cureus*. 2023 Nov;15(11).
12. Abbas HA, Khudari SY, Almalki RH, Abed RT, Sait SA, Sulaiman AA. Public knowledge and attitude toward basic life support in Jeddah, Saudi Arabia. *Int J Community Med Public Health*. 2021 Mar;8:1082-90.
13. One T. *Prehospital and Emergency Care* 2023.
14. Kamphausen A, Roese H, Oechsle K, Issleib M, Zöllner C, Bokemeyer C, Ullrich A. Challenges faced by prehospital emergency physicians providing emergency care to patients with advanced incurable diseases. *Emergency Medicine International*. 2019;2019(1):3456471.
15. Merriel A, Ficquet J, Barnard K, Kunutsor SK, Soar J, Lenguerrand E, Caldwell DM, Burden C, Winter C, Draycott T, Siassakos D. The effects of interactive training of healthcare providers on the management of life-threatening emergencies in hospital. *Cochrane Database of Systematic Reviews*. 2019(9).
16. Tara T, Singh G. Effectiveness of Awareness Training on Birth Preparedness and Complication Readiness among Community Health Workers of New Delhi, India. *Indian Journal of Community Medicine*. 2024 Sep 1;49(5):713-8.
17. Azlan AA, Hamzah MR, Sern TJ, Ayub SH, Mohamad E. Public knowledge, attitudes and practices towards COVID-19: A cross-sectional study in Malaysia. *Plos one*. 2020 May 21;15(5):e0233668.
18. Shannon C. Understanding community-level disaster and emergency response preparedness. *Disaster medicine and public health preparedness*. 2015 Jun;9(3):239-44.
19. Abir M, Dowker SR, Nham W, Berri N, Fouche S, Nelson C, Forman J, Fetters MD, Mendel P, Guetterman T, Forbush B. Strategies for enhancing prehospital outcomes for cardiac arrest (EPOC). *Rand Health Quarterly*. 2023 May;10(2).
20. Kılıç N, Şimşek N. The effects of psychological first aid training on disaster preparedness perception and self-efficacy. *Nurse education today*. 2019 Dec 1;83:104203.