

Basic Life Support Measures Training among High School Students: an Untapped Workforce

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ABSTRACT

Background: In the wake of recent increasing incidences of out of hospital cardiac arrest (OHCA) even in younger population, training of high school students in basic life support (BLS) or cardiopulmonary resuscitation (CPR) measures could help save lives and improve outcomes. So, current study was planned to assess the knowledge and attitude about BLS measures among high school students. **Methodology:** From the four selected schools of Ludhiana district, 400 students of 9th and 10th class were included in the study after approval from school administration. A preformed questionnaire was introduced to the students followed by an interaction on concept of BLS by the investigators. The data was analysed using percentages, proportion and Chi square test for qualitative variables. A p-value of less than 0.05 was considered as statistically significant. **Results:** Out of 400 students, only 128 (31.75%) had heard about BLS/CPR and 30.2% of students had seen someone performing BLS/CPR. Nearly 83% of students did not have any formal training on BLS and 81% felt that their knowledge regarding BLS was insufficient. Approximately 77% students were willing to perform CPR after receiving training and 81% suggested that it should be made part of school curriculum. Higher number of students in the age group of 16-18 years felt the need of BLS training as compared to that in 13-15 years (83.7% vs. 77.6%) and were willing to perform CPR after being trained (82.9% vs. 74.7%). **Conclusions:** Current knowledge in high school students about BLS is low, yet if given appropriate training, these students have the potential to save lives and moreover, students are willing to learn. So, BLS training should be made part of school curriculum as students are already in the learning phase of their lives and this will immensely benefit the community.

KEYWORDS

Attitudes; Basic Life Support (BLS); Knowledge; Out of Hospital Cardiac Arrest (OHCA); School Students

INTRODUCTION

American Heart Association and American College of Cardiology define cardiac arrest as “the abrupt loss of heart function in a person who may or may not have been diagnosed with heart disease.” (1) Out of-Hospital Cardiac Arrest (OHCA) is a major public health concern, with approximately 420,000 cardiac arrests in the USA and 275,000 in Europe annually. (2-5) Survival rates are quite low ranging between 2-20% and are even lower if there is no

immediate bystander response. (6) Mortality and morbidity statistics in OHCA is quite high, more so in developing countries as compared to developed nations, which may be due to lack of education and awareness about the basic life support (BLS) measures in the general public. Typical Emergency medical response system is almost non-existent or is in infancy in our nation and the critically important time has already passed when the victim reaches emergency door of a hospital. OHCA causes

lack of perfusion of oxygenated blood to vital organs including brain, heart as well as other tissues and results in permanent cellular impairment within 5 minutes of cardiac arrest in absence of effective BLS. Providing BLS increases the chance of survival by 2 to 4 times by the time help arrives or patient reaches hospital. (7) It has been observed that bystander CPR rate in India is quite low (1.3%–9.8%), against the target of 62% set by the American Heart Association Emergency Cardiovascular Care (AHA-ECC). (8,9) BLS techniques include some simple steps which are easy to apply and may help to save a life if done effectively. (10) With each minute of delay in resuscitation, chances of return of spontaneous circulation and survival from a sudden cardiac arrest reduces by 7–10%. (11) BLS refers specifically towards the level of assistance that when administered promptly by the first responders to a victim of cardiac arrest, respiratory problems or obstructed breathing, increases the chance of surviving throughout most emergency conditions. (12) Basic steps of BLS include immediate recognition of sudden cardiac arrest (SCA), activation of the emergency response system, early cardiac compressions, and rapid defibrillation with an automated external defibrillator (AED). (13) Studies have shown that school students who are already in the learning phase of their lives can be trained in BLS/CPR, thus increasing the trained workforce in the community. (14-17) In India, the school going children could become a major BLS trained workforce for the community. (18, 19) Therefore, this study was planned to assess the knowledge and attitude about Basic Life Support measures among high school students. This may help to generate a training module and further formulate a policy about teaching these necessary basic life-saving skills to school-going children at a younger age.

MATERIAL & METHODS

Study design: This cross-sectional study was conducted in 4 schools of Ludhiana city of Punjab, North India out of which 2 were government and two were private schools. The study was approved by institutional ethics committee with reference number DMCH/R&D/20201/96. Prior approval was taken from administration of participating schools. Assent was taken from students and consent from their parents. Those who submitted signed consent forms were included in the study.

Inclusion criteria: All school students from 9th and 10th standard in the selected schools, who were willing to participate and got the consent forms signed from their parents/guardians, were included in the study. Those who didn't give the consent were excluded from the study.

Study area and sample size: Two private and two government high schools were selected by convenience sampling method so as to give adequate representation to students of various socio-economic strata. One Hundred students were selected from 9th & 10th standards from each of these four selected schools thus generating a total sample size of 400 students. From each class, the required number of students was selected by simple random sampling method.

Study tool: A preformed structured validated questionnaire based performa was formulated by using available literature and taking inputs of experts from departments of Anaesthesia, Critical Care Medicine and Community Medicine. The questionnaire was developed in English, Hindi and Punjabi language and it contained the demographic details and information about awareness, knowledge and attitude of school students about BLS. The questionnaire was validated by introducing it to ten school students for checking comprehension and ease of understanding prior to start of study. Study questionnaire was self-administered and performa was available in English, Hindi and Punjabi. Students were explained the purpose of study and were told literal meaning of some difficult terms if they asked.

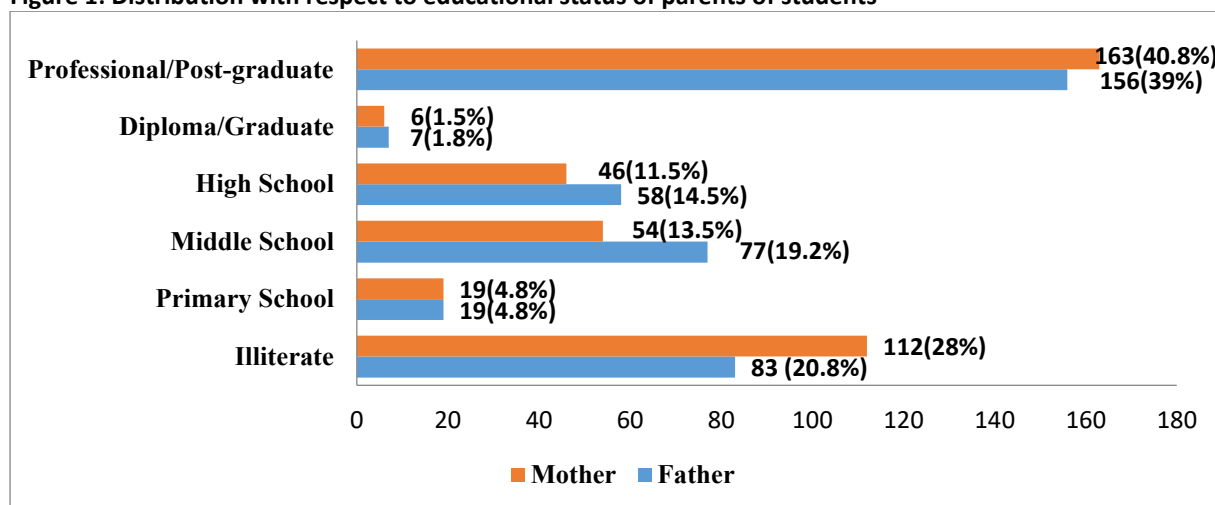
Data collection: From the four selected schools, 50 students each were selected from 9th and 10th standards respectively thus making a total sample size of 400. The questionnaire was introduced to the selected students with the help of their teachers. After the students had completed the questionnaire and handed it back to investigator, an interaction on concept of BLS and CPR was conducted by the investigators with the students and their queries were answered. Privacy and confidentiality of data was ensured during the study.

Data Analysis: The data so generated were entered in Microsoft Excel® software and analysed using percentages, proportion and Chi square test for qualitative variables. A p-value of less than 0.05 was considered as statistically significant.

RESULTS

Out of 400 students enrolled from 9th and 10th standards and from Government and Private schools, majority were in the age group of 13-15 years (69.25%) followed by 16-18 years (30.8%). Male students were 57% (228) whereas female students were 43% (172). Parents of maximum school students (39% of fathers and 40.8% of mothers) were educated till Diploma/Graduate/Professional degree; however, 20.8% of fathers and 28% of mothers of study participants were illiterate as shown in Figure 1.

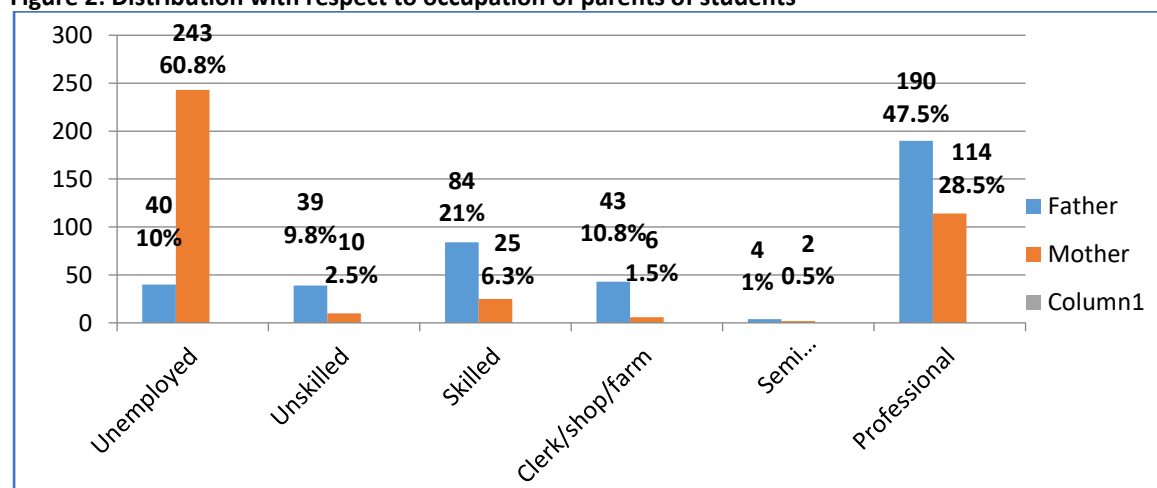
Figure 1: Distribution with respect to educational status of parents of students



The occupational status of parents of study participants was as depicted in figure 2. Maximum number of the students (60.8%) had mothers as homemakers whereas 47.5% of students had fathers working in professional occupation. There

was no significant association between the knowledge of students about BLS/CPR with the educational and occupational status of their parents.

Figure 2: Distribution with respect to occupation of parents of students



A semi-structured questionnaire was used to assess the knowledge and attitude of study participants towards BLS and CPR (Table 1). Out of total 400 participants, only 128 (31.75%) of participants had

heard about BLS/CPR before and 30.2% of students had seen someone performing BLS/CPR. Nearly 40% of students responded that they had encountered some life-threatening situation in life.

Table 1: Knowledge and attitude of participants regarding BLS/CPR

Q Code	Question	Yes (%)	No (%)
Q1	Have you ever heard of term BLS /CPR before?	128 (31.75)	272(68.25)
Q2	If heard of BLS/CPR before, source of information		
	School	35(27.34)	
	Internet	48(37.5)	
	TV/movies/ newspaper	23(17.8)	
	Friends and family	22(17.36)	
Q3	Have you ever seen anyone performing BLS/CPR?	121(30.25)	279(69.75)
Q4	Have you ever come across life threatening situation?	160 (40.0)	240(60.0)
Q5	Have you ever had formal training in BLS?	71 (17.75)	329(82.25)

Q Code	Question	Yes (%)	No (%)
Q6	Have you ever had knowledge about emergency number of ambulance/Hospital?	315 (78.75)	85(21.25)
Q7	Do you feel that your knowledge about BLS/CPR is sufficient?	78 (19.53)	322(80.5)
Q8	Have you ever felt the need of having CPR training?	318 (79.5)	82(20.5)
Q9	Willingness to perform CPR after receiving training	309 (77.25)	91(22.75)
Q10	Should CPR training be included in school study?	324 (81.0)	76(19.0)

Only around 17% of participants had some formal training on BLS and 19% felt that their knowledge regarding BLS was sufficient. Approximately 79% participants knew about the emergency number of ambulance/hospital. It was encouraging to know that 80% of students felt the need of some formal training regarding BLS and 77% were willing to undergo the BLS training. BLS training should be a part of school curriculum was suggested by 81% of students. It was also observed that Internet was

their major source of information about BLS (37.5%). The majority of students (95.25%) believed that BLS training is important for school students (table 1). On being asked whether BLS/CPR training should be included in school curriculum, 81% of students suggested that it should be included. Out of total 400 students, 309 (77.25%) were willing to perform CPR after receiving training and 95% of students considered it important for them to have this training (figure 3).

Figure 3: Grading the importance of BLS training by students

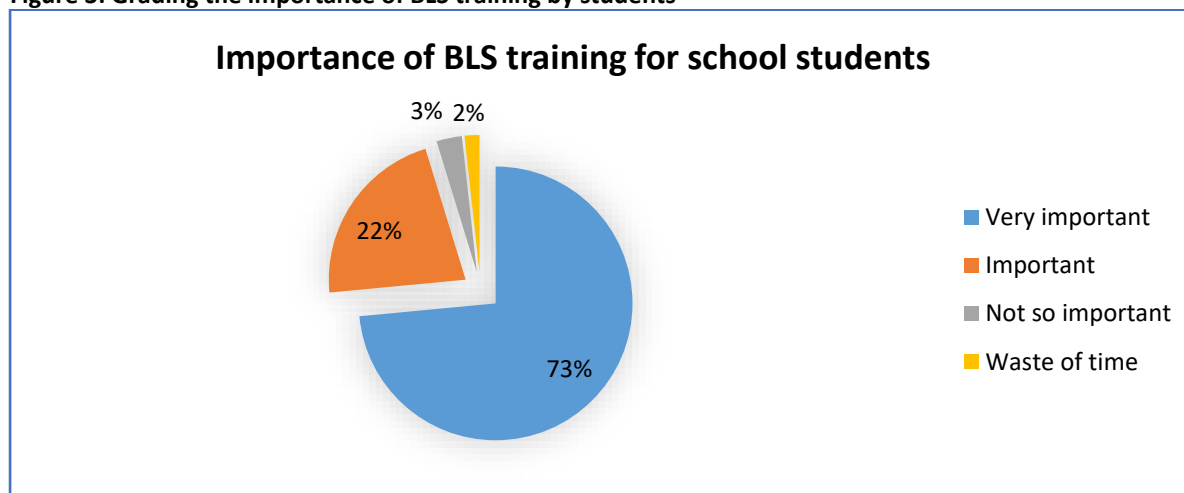


Table 2 shows the association of knowledge and attitude of students regarding BLS with respect to age and gender. It was observed that more number of students (33.9%) from age group 13-15 years had heard about term BLS/CPR (Q1) than 16-18 year age group students (27.6%) but difference was statistically not significant. From age group 13-15 years, 22.7% of students reported having some

formal training (Q5) in BLS/CPR while only 6.5% students of 16-18 years age group had formal training, this difference was statistically significant. Higher number of students in the age group of 16-18 years (Q 8) as compared to that in 13-15 years felt the need of BLS training (83.7% vs. 77.6%) and were willing to perform CPR (Q 9) after being trained (82.9% vs. 74.7%).

Table 2: Knowledge and attitude of participants regarding BLS/CPR with respect to age and gender

Q Code	Age in yrs		Chi square value	P value*	Gender		Chi square value	P value*
	(13-15) (n=277)	(16-18)(n=123)			MALE(n=228)	FEMALE (n= 172)		
Q1	94 (33.9)	34 (27.6)	1.55	0.213(NS)	72 (31.5)	56 (32.5)	0.043	0.835(NS)
Q3	80 (28.8)	41 (33.3)	0.8	0.371(NS)	73 (32.1)	48 (27.9)	0.785	0.376 (NS)
Q4	102 (36.8)	58 (47.1)	3.788	0.051(NS)	87 (38.1)	73 (42.0)	0.749	0.387 (NS)
Q5	63 (22.7)	8 (6.5)	15.39	0.000(HS)	41 (17.9)	30 (17.4)	0.019	0.889 (NS)
Q6	212 (76.5)	103(83.7)	2.64	0.104(NS)	175(76.7)	140 (81.3)	1.262	0.261 (NS)
Q7	61 (22.02)	17 (13.8)	3.65	0.056 NS)	41 (17.9)	37 (21.5)	0.778	0.378 (NS)
Q8	215 (77.6)	103(83.7)	1.96	0.161(NS)	182(79.8)	136 (79.1)	0.034	0.853 (NS)
Q9	207 (74.7)	102(82.9)	3.26	0.071(NS)	171(75.0)	138 (80.0)	1.527	0.217 (NS)
Q10	228 (82.3)	96 (78)	1.01	0.316(NS)	180(78.9)	144 (83.7)	1.452	0.228 (NS)

*NS-Not significant; HS-Highly significant, Numbers in parenthesis indicate percentages

Students from younger age group (13-15 years) were more inclined that BLS training should be a part of school curriculum (Q 10).

The association of knowledge/attitude about BLS/CPR with respect to gender of school students highlighted (table 2) that almost equal proportion of male and female students had heard of term (Q1) BLS/CPR before.

Nearly 32% of male and 27.9% female students had seen someone performing BLS/CPR before (Q3) while nearly 17% reported having undergone some formal BLS training (Q5). Knowledge and attitude of male and female students about BLS was almost comparable with each other and no significant difference was seen in these two groups. Table 3 shows the association of knowledge regarding BLS/CPR with class and type of school of students. It was observed that a greater number of students (26.5%) from class 9th reported having formal training in BLS (Q5) as compared to class 10th

students (9%) and this difference was statistically significant. From 10th class, only 15.5% students felt that their knowledge about BLS was sufficient (Q7) while 23.5% of students from 9th class felt so. A significantly higher percentage of 10th class students (83.5%) as compared to 9th class students (75.5%) felt the need of having CPR training (Q8). Majority of students from class 10th (89%) were willing to perform CPR (Q9) after receiving training which was significantly more than those from 9th class.

It was also observed that a greater number of students (42% vs. 22%) from private school as compared to government schools had heard of term BLS/CPR before (table 3) and 94.5% of students from private school felt the need of having CPR training and 89% of them were willing to perform CPR after receiving training, all these proportions were significantly more than those for Government schools.

Table 3: Knowledge and attitude of participants regarding BLS/CPR with respect to Class and type of school

Q Code	Class		Chi square value	P value*	Type of school		Chi square value	P value*
	9 th (n= 200)	10 th (n=200)			Government(n= 200)	Private(n = 200)		
Q1	64 (32)	64 (32)	-		44 (22)	84 (42)	18.38	<0.001 (HS)
Q3	68 (34)	53 (26.5)	5.301	0.0213(S)	72 (36)	49 (24.5)	6.27	0.012 (S)
Q4	76 (38)	84 (42)	0.667	0.414(NS)	108 (54)	52 (25)	32.67	<0.001(HS)
Q5	53 (26.5)	18 (9)	20.97	<0.001(HS)	24 (12)	47 (23.5)	9.05	0.002 (HS)
Q6	157(78.5)	158 (79)	0.015	0.902 (NS)	157 (78.5)	158 (79)	0.015	0.902 (NS)
Q7	47 (23.5)	31 (15.5)	4.077	0.043 (S)	47 (23.5)	31 (15.5)	4.077	0.043 (S)
Q8	151(75.5)	167(83.5)	3.927	0.048 (S)	129 (64.5)	189(94.5)	55.22	<0.001(HS)
Q9	131(65.5)	178 (89)	31.42	<0.001(HS)	131 (65.5)	178 (89)	31.42	<0.001(HS)
Q10	161(80.5)	163(81.5)	0.065	0.799 (NS)	131 (65.5)	193(96.5)	62.44	<0.001(HS)

*NS-Not significant; HS-Highly significant, Numbers in parenthesis indicate percentages

From private school, 96.5% students suggested that CPR training should be included in school curriculum while significantly lesser percentage of students from government schools (65.5%) suggested so.

DISCUSSION

Cardiovascular diseases cause 30% of global mortality leading to 17 million deaths every year. Cardiac conditions and ventricular tachyarrhythmia account for majority of these deaths and around 40–50%of the deaths are caused by sudden cardiac arrest. (18) Learning BLS techniques require nothing more than human resource and have global implication in improving survival from cardiac arrest. (19) In a study conducted by Diana M. Cave, it was shown that OHCA mortality is expected to decrease significantly if basic life support is provided to even 15 to 20 % of victims. (20)

The present study was conducted among 400 school students, of which 50% were from government and 50% were from private schools. The study highlighted that there is poor knowledge about BLS/CPR among students of both private and government schools. More students from the 13–15 year age group had received formal training in BLS than those in the age group of 16 to 18 years. However, a study conducted by Parnell et al in New Zealand reported a much higher proportion of school students being trained in BLS and CPR. (21) In our study, only 19.5% of students felt that their knowledge of BLS/CPR was sufficient and only 17.8% had received some formal training in BLS. It is heartening to know that more than 80% students wanted BLS/CPR training to be included in study curriculum. Similarly, in a study conducted by Petric J et al, it was observed that students had favourable attitude towards BLS training in primary schools. (22)

In present study, parents of majority of students had professional degree with father working in professional occupation and mothers as homemakers. But there was no significant association between the knowledge of students about BLS/CPR with the educational and occupational status of their parents. There were no significant differences seen in knowledge and attitude about BLS/CPR between male and female students in the present study. The term BLS/CPR was heard by 33.9% of those aged 13 to 15 years and 27.6% of those aged 16 to 18 years in the present study. These observations were similar to another study conducted in Belgium among school children. Students of primary school had more knowledge of BLS and they performed better after training. (23) This distinction is most likely due to the fact that youthful minds are more receptive, enthusiastic and brings new perspectives. Thus, involving youth is a sound investment in such trainings. A cohort study was conducted by Bohn et al in Germany including 433 students where almost a two-fold increase in confidence of students was reported regarding BLS. It was concluded that early training would increase willingness to perform CPR. (24)

Nearly 42% students from private schools had heard about BLS/CPR before and more students from private schools reported having received some formal BLS training in our study. This could be due to more awareness in private school students than in government school students probably because of better opportunities and more versatile curriculum implementation in private schools. A higher proportion of students from private schools were willing to undergo training in BLS and also to perform BLS afterwards than students from Government schools. Almost all students (96.5%) from private schools and 65.5% students of government schools were in favour of the inclusion of BLS/CPR training in school curriculum which is quite encouraging. In another study conducted among secondary school students in Norway showed that 83% of students were willing to perform CPR and 86 % were in favour of mandatory BLS training in schools.(14) In study on knowledge and attitudes towards BLS among students in 5 colleges of University in Riyadh, Saudi Arabia, 87.9% students had poor knowledge about BLS, but they had positive attitude towards BLS training and 77% of students showed interest in receiving BLS training whereas 78.5% students were in favour of mandatory BLS training. (25) International Liaison Committee on Resuscitation (ILCOR) has recently published guidelines regarding detection of cardiac arrest, chest compression and depth, duration of training, appropriate starting age in young

children(<20years) etc in their scientific statement based on review of the existing literature regarding teaching BLS to schoolchildren.(6) At many places worldwide, to increase the participation of students and bystanders in providing BLS, comprehensive public initiatives have been initiated and training high school students is a key element in these initiatives.(26)

CONCLUSION & RECOMMENDATION

In this study, it was observed that the students of class 9th and 10th had poor knowledge about BLS/CPR and very few students had formal training for the same. Students showed a positive attitude and majority of them suggested that BLS/CPR training should be included in the school curriculum and were willing to perform BLS/CPR after training. School being a perfect place to teach the population about BLS where students are already in the learning phase of their lives, the findings of this study will help to generate a training module and further formulate a policy about teaching these necessary basic life-saving skills to school-going children at a younger age.

LIMITATION OF THE STUDY

Limitations of the study could be that data collection was restricted to one district; hence results from it may not project a true picture of other regions of India, so more such studies are needed. We also did not assess the factual knowledge of students and only asked them if they were aware about the concept of BLS and CPR, because through this study we wanted to assess the current awareness, attitude and perception of school students. Once they receive training then only we would be able to assess the factual knowledge.

RELEVANCE OF THE STUDY

The school going children are at the right age of learning and if important trainings like BLS are incorporated in the curriculum, the students will be more receptive and may have long term retention of the knowledge so gained. So by incorporating such trainings in the schools, we will be able to generate a trained motivated work force which may be available at places of sudden cardiac arrest in the community. Their positive attitude shows that students can work as trained workforce who can save a cardiac arrest victim's life. In our country also some initiatives have been taken by medical associations at their own level, but these trainings need to be made mandatory for high school students as well as professional colleges. Anaesthesiologists and Critical care specialists as well as accredited BLS trainers being at the core of

these training programmes can come forward in a big way in drafting these policies and implementing them along with help of district administration

AUTHORS CONTRIBUTION

All authors have contributed equally.

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Nil

CONFLICT OF INTEREST

Nil

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DECLARATION OF GENERATIVE AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

The authors haven't used any generative AI/AI assisted technologies in the writing process.

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