National Board of Examinations - Journal of Medical Sciences
Volume 2, Issue 4, Pages 282–298, April 2024
DOI 10.61770/NBEJMS.2024.v02.i04.002

ORIGINAL ARTICLE

Empowering Communities: NBEMS's Nationwide Cardio-Pulmonary Resuscitation Awareness Program

Abhijat Sheth,[1] Minu Bajpai,[2,*] Rakesh Sharma,[3] Anurag Agarwal,[3] Vinay Gupta,[3] N. Iboyaima Mangang,[3] Hari Kishan[4] and M. Radhika[5]

[1]*Senior Consultant, Cardiothoracic Surgeon & C.E.O., Apollo Hospital, Ahmedabad & President, National Board of Examinations in Medical Sciences, Medical Enclave, Ansari Nagar, Mahatma Gandhi Marg, Ring Road, New Delhi, Delhi – 110029*

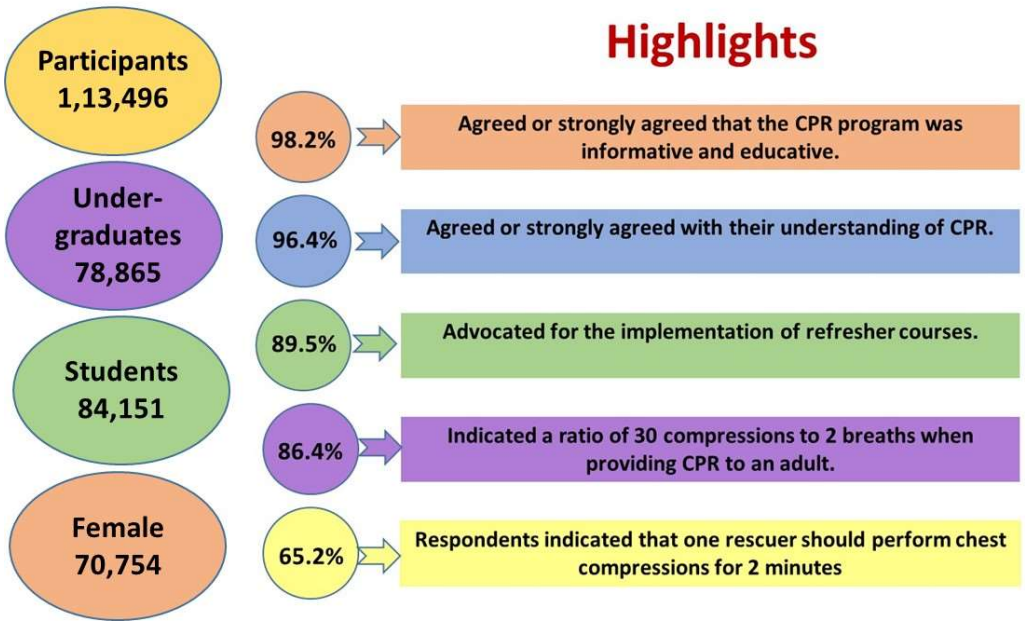
[2]*Vice President and Honorary Executive Director, National Board of Examinations in Medical Sciences, Medical Enclave, Ansari Nagar, Mahatma Gandhi Marg, Ring Road, New Delhi, Delhi – 110029*

[3]*Additional Director, National Board of Examinations in Medical Sciences, Dwarka Sector 9 Road, PSP Area, New Delhi -110075.*

[4]*Research Associate, National Board of Examinations in Medical Sciences, Dwarka Sector 9 Road, PSP Area, New Delhi -110075.*

[5]*Assistant Director, National Board of Examinations in Medical Sciences, Dwarka Sector 9 Road, PSP Area, New Delhi -110075.*

Accepted: 29-March-2024 / Published Online 31-March-2024



*Corresponding Author: Minu Bajpai
Email: bajpai2b@gmail.com

Introduction

Elaborating on National Board of Examinations in Medical Sciences (NBEMS) commitment to societal welfare, the CPR Awareness Program slated for December 6th, 2023, at 09:30 AM across the nation represents a significant stride towards bolstering public health preparedness and community resilience. By organizing this comprehensive initiative, NBEMS aims to address a crucial gap in emergency response capabilities by equipping thousands of youths and non-medical personnel with the necessary skills and knowledge to effectively administer CPR.

The overarching goal of the CPR Awareness Program is twofold - firstly, to raise widespread awareness about the importance of CPR in saving lives during cardiac emergencies, and secondly, to provide practical training to participants, thereby empowering them to respond swiftly and competently in critical situations.

Through a meticulously planned curriculum, NBEMS endeavors to demystify the process of CPR, ensuring that participants grasp its fundamental principles and techniques. By imparting hands-on training, supplemented by educational resources and instructional materials, NBEMS seeks to instill confidence and proficiency in CPR administration among attendees, irrespective of their medical background.

The program's inclusive approach underscores NBEMS's commitment to reaching a diverse demographic, encompassing youths and individuals from various professions and walks of life. By engaging a broad cross-section of society, NBEMS endeavors to foster a culture of collective responsibility, wherein every citizen plays an active role in safeguarding community health and well-being.

Furthermore, the nationwide scope of the program underscores NBEMS's dedication to extending its impact far and wide, transcending geographical boundaries to reach communities in both urban and rural settings. By orchestrating simultaneous events across the country, NBEMS maximizes its outreach, ensuring that individuals from all corners of the nation have access to vital CPR training and education.

Background

The rising trends of heart diseases in India

COVID-19 is known to affect multiple organ systems, including the cardiovascular system. Complications such as myocarditis (inflammation of the heart muscle), arrhythmias, and blood clotting issues can arise during or after a COVID-19 infection. These complications can predispose individuals to long-term heart problems, potentially leading to an increased incidence of heart disease post-pandemic [1].

The COVID-19 pandemic has brought about significant stress and lifestyle changes for many individuals, including increased sedentary behavior, unhealthy eating habits, disrupted sleep patterns, and heightened psychological stress. These factors can contribute to the development or exacerbation of risk factors for heart disease, such as obesity, hypertension, diabetes, and dyslipidemia. Some individuals experience lingering symptoms long after recovering from acute COVID-19 infection, a condition often referred to as "long COVID" or "post-COVID syndrome." Cardiovascular symptoms, such as chest pain, palpitations,

and shortness of breath, are among the reported long-term effects [2,3]. These symptoms can contribute to the burden of heart disease in the post-pandemic period.

Accidents, Trauma, Stroke, and other emergency situations

The latest Global Status Report on Road Safety by the World Health Organization (WHO) reveals concerning trends regarding road traffic deaths worldwide. Despite a slight global reduction in the annual number of road traffic deaths, the report highlights persistent challenges, particularly in countries like India, where the numbers continue to rise [4].

The burden of road accidents in India is a pressing concern, as highlighted by Union Minister of Road Transport and Highways, Nitin Gadkari. His statement underscores the gravity of the situation, emphasizing the need for urgent action to address this growing problem.

According to Gadkari, the latest statistics reveal alarming figures: 53 road accidents and 19 deaths occur every hour across the country. This staggering frequency underscores the severity of the issue and the urgent need for effective measures to mitigate it.

Furthermore, the data indicates a troubling trend of increasing road accidents and related fatalities. Gadkari noted a 12% rise in road accidents and a 10% increase in road accident-related deaths, indicating a worsening situation that demands immediate attention.

Perhaps most concerning is the demographic most affected by these accidents. Over 60% of the victims are young individuals, aged between 18 and 35 years old. This not only highlights the tragic loss of life but also the impact on the future of the nation, as young people are disproportionately affected by these preventable incidents.

In response to these distressing statistics, the government has set an ambitious target to halve the number of road accidents by 2030. This goal reflects a commitment to improving road safety and protecting the lives of citizens [2].

CPR (Cardiopulmonary Resuscitation) is not only crucial in response to cardiac arrests but also plays a significant role in providing emergency care for individuals involved in road accidents.

Apart from the road accident, trauma and other emergency situation, in-house heart attacks can be sudden and life-threatening emergency, highlighting the crucial importance of prompt action, including the application of CPR (Cardiopulmonary Resuscitation) techniques. CPR plays a vital role in maintaining blood flow and oxygenation to the vital organs, particularly the brain, until professional medical help arrives.

The importance the CPR awareness and training program

In the critical moments following a heart attack, every second counts. CPR allows bystanders to take immediate action, providing essential care while waiting for emergency medical services to arrive. Starting CPR promptly can significantly increase the chances of survival. During a heart attack, the heart's ability to pump blood effectively may be compromised. CPR helps maintain circulation by manually compressing the chest, thereby delivering oxygen-rich blood to vital organs such as the brain and heart muscle. This circulation is crucial for preventing

permanent damage and increasing the likelihood of recovery.

CPR also helps oxygenate the blood by artificially ventilating the lungs through rescue breaths. By providing oxygen to the body's tissues, CPR helps sustain cellular function and prevents organ damage due to oxygen deprivation. Heart attacks often occur when professional medical assistance may not be immediately available. CPR buys precious time, keeping the person alive until advanced medical care, such as defibrillation or medications, can be administered by trained professionals.

Training individuals in CPR empowers them to take action in emergency situations. With the knowledge and skills to perform CPR, bystanders can become invaluable first responders, potentially saving lives within their own homes or communities.

The National Board of Examinations (NBE) has taken an initiative to conduct live demonstrations of CPR (Cardiopulmonary Resuscitation) techniques, coupled with educational programs, is of paramount importance. A brief description in images is given below (Figures 1 to 24):

Figure 1. Dr. Abhijat Sheth, President, National Board of Examinations in Medical Sciences, Delhi introduced the course and explored the importance

Figure 2. Dr. Debashis Dhar (Left) Dr. Sanjeev Mittal (Right), Sir Ganga Ram Hospital, Delhi explained the condition, when and how to use CPR technique

Figure 3. Ask the nearby person to get the emergency kit, automated external defibrillator (AED) and activate emergency.

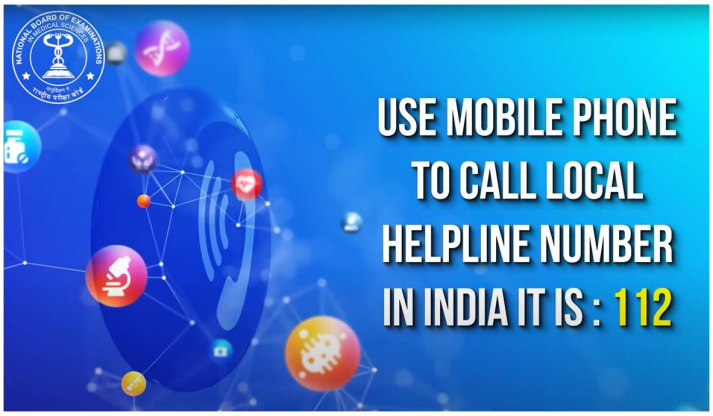


Figure 4. If no one is available, use your mobile phone to call the local helpline number (in India it is 112) and activate the emergency response system.

Figure 5. While help is on the way check for the carotid pulse. The technique of carotid pulse is feel for the trachea at the centre, slide two to three fingers a side of the neck and check for the breathing. Ensure to finish the examination within 5 to 10 seconds.

Figure 6. If unresponsive, no breathing or gasping, no pulse, start the CPR immediately.

Figure 7: Ensure the person is lying on hard surface, remove the cloths from the chest.

Figure 8. Start CAB sequence of CPR i.e. compression, airway and breathing.

Figure 9. Place the dominating hand on centre part of chest of the patient.

Figure 10. Place the other hand on the top of the first hand and interlock your fingers

Figure 11. Elbow should be straight, Position yourself vertically, presses should be from shoulders.

Figure 12. Compress to a depth of 5-6 cms. Allow complete chest recoil

Figure 13. Start chest compressions at the rate of 100-120 per minute

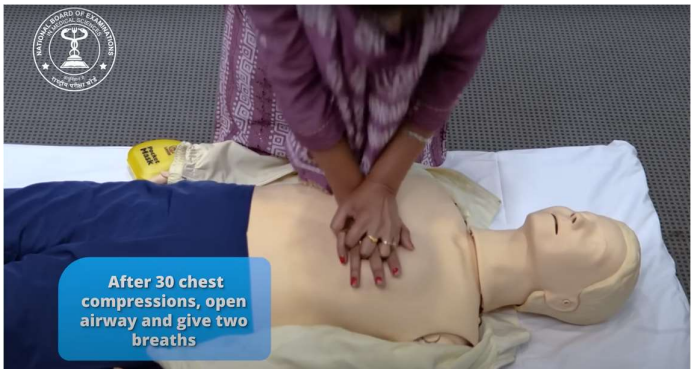


Figure 14. After 30 chest compression, open airway and give two breath

Figure 15. Before giving breath, open airway by using head tilt chin lift method.

Figure 16. A pocket mask can be used, if available for mouth to mouth breath. If you failed to two breath in 10 seconds, resume cardiac compression. This process should be continued till the AED or help arrives.

Figure 17. Switch on AED and follow voice commands of AED

Figure 18. AED operation have two steps, first step is switching on the AED and second is to follow the voice command. The rescuer continued the cardiac compression and operation of AED.

Figure 19. Place the adhesive pads on the chest of victim according to the picture displayed on the AED pads. Place one pad on the right side of chest just below the collar bone and second pad on the left side of the nipple on left side of chest. After placing the pads, AED plugged with pads it will take 10-15 second to analyze the rhythm.

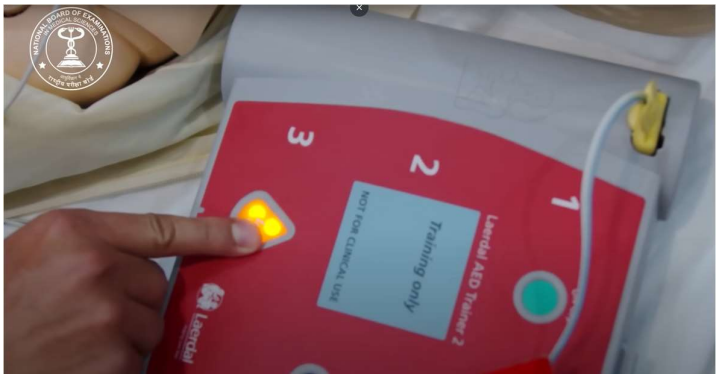


Figure 20. If a shock is advised charge AED and press the orange button.

Figure 21. If needed, continue CPR without removing the AED pads just turn it off.

Figure 22. The cycle of 30 compressions and two breath will be continued till the help arrive. The medical experts then will take the charge of the victim.

Figure 23. Summary of CPR – In eight steps

Figure 25. The procedure to enroll for the participation and generating digital participation certificate from NBEMS.

Outcome of the activity (Results)

Gender base outcome of the participants

The participation of 113,496 individuals in the CPR awareness program organized by NBEMS on the 6th of December, 2023, underscores the significant impact and reach of the initiative. This diverse turnout reflects a collective commitment towards enhancing community health and safety through education and training in cardiopulmonary resuscitation (CPR).

Education base interpretation of outcome

The breakdown of participants based on their educational qualifications in the CPR awareness program, provides valuable insights into the demographics and educational backgrounds of the attendees. This analysis sheds light on the diverse representation of individuals with varying levels of educational attainment, each contributing to the collective effort of promoting CPR awareness and preparedness within their communities.

Among the total participants, 2,532 individuals, comprising 2.2% of the attendees, held above post-graduate qualifications. This cohort likely includes individuals with advanced degrees such as master's or doctoral degrees, who bring a depth of knowledge and expertise to the program. Their participation underscores the importance of continued education and professional development in the healthcare domain, as well as their dedication to enhancing their skill set to better serve their communities.

The presence of 15,347 participants with post-graduate qualifications, constituting 13.5% of the total, highlights the engagement of individuals with bachelor's degrees or equivalent qualifications. These attendees likely possess a solid foundational understanding of healthcare concepts and may include professionals from diverse fields such as nursing, allied health sciences, or public health. Their involvement in the program demonstrates a proactive approach towards expanding their skill set and contributing to public health initiatives beyond their academic or professional roles.

Similarly, 16,751 participants, representing 14.8% of the total, reported

graduate qualifications. This cohort likely comprises individuals pursuing bachelor's degrees or equivalent undergraduate programs across various disciplines. Their participation reflects a diverse range of interests and backgrounds, indicating a broad cross-section of society invested in learning life-saving skills like CPR. It also underscores the program's accessibility and appeal to individuals at different stages of their educational journey, from recent graduates to those currently enrolled in undergraduate studies.

The largest contingent of participants, **numbering 78,865 individuals, accounted for 69.5% of the total attendees, indicating that they were pursuing undergraduate qualifications at the time of the program.** This substantial representation underscores the program's success in engaging young adults and students, who are often eager to acquire practical skills and make meaningful contributions to their communities. Their active involvement in the CPR awareness program highlights the potential for cultivating a generation of informed and empowered individuals capable of responding effectively to emergency situations.

Institution base participation and types of Institution

The breakdown of institutions participating in the CPR awareness program provides valuable insights into the collaborative efforts of various educational and professional entities in promoting emergency preparedness and healthcare training. This analysis highlights the diverse range of institutions and their respective contributions to the program, underscoring the collective commitment towards enhancing public health awareness and equipping individuals with life-saving skills.

Out of the total 22,640 participating institutions, dental colleges and staff accounted for 998 institutions, representing 0.9% of the total. This category includes institutions specializing in dental education and practice, emphasizing the importance of oral health professionals in emergency medical response. Their participation reflects a recognition of the broader healthcare landscape and the crucial role dentists and dental staff can play in emergency situations requiring CPR.

Medical colleges, faculty, and staff comprised 4,239 institutions, constituting 3.7% of the total participants. As hubs of medical education and training, medical colleges play a central role in shaping the future healthcare workforce. The active involvement of faculty and staff from these institutions underscores their commitment to comprehensive medical education, including essential skills like CPR, which are vital for both students and practicing healthcare professionals.

Similarly, 3,427 institutions accredited by NBEMS participated in the program, accounting for 3.0% of the total. These institutions adhere to NBEMS standards and guidelines, ensuring the quality and consistency of medical education and training. Their participation reinforces the credibility and endorsement of the CPR training program by a reputable accrediting body, instilling confidence in participants regarding the program's effectiveness and relevance to medical practice.

Nursing colleges, faculty, and staff represented the largest contingent, with 10,886 institutions participating, accounting for 9.6% of the total. Nursing professionals play a critical role in

healthcare delivery, often serving as frontline responders in emergency situations. The significant participation of nursing colleges and staff underscores the importance of nursing education in imparting essential skills like CPR and emphasizes the pivotal role nurses play in ensuring timely and effective patient care.

Pharmacy colleges, faculty, and staff accounted for 5,223 institutions, constituting 4.6% of the total participants. Pharmacists are integral members of the healthcare team, and their participation in CPR training reflects their commitment to expanding their scope of practice beyond medication management to include emergency response and patient care.

Professional organizations, faculties, and staff, representing 1,758 institutions, contributed 1.5% to the total participation. These organizations serve as advocacy groups and forums for professionals across various healthcare disciplines. Their involvement in the CPR training program underscores their dedication to advancing best practices in healthcare and promoting continuous professional development among their members.

The largest segment of participants comprised students, with 84,151 institutions represented, accounting for a significant 74.1% of the total. This high level of student engagement reflects the program's appeal to the next generation of healthcare professionals and underscores the importance of early exposure to essential skills like CPR during their education and training.

CPR awareness program – post-demonstration quiz

After the CPR program's demonstration, a post-demonstration quiz was administered to gauge participants' perceptions of the program's effectiveness. Respondents were asked to indicate their agreement or disagreement with the statement: **"The program was very informative and educative."** The results of the quiz are as follows:

A. Agree: 28,868 participants
B. Disagree: 435 participants
C. Strongly agree: 82,623 participants
D. Strongly disagree: 1,569 participants

The majority of participants, **totaling 111,491 (98.2%) individuals, either agreed or strongly agreed that the CPR program was informative and educative. This response indicates a high level of satisfaction and perceived value among the participants regarding the content and delivery of the program**. Additionally, the relatively low number of participants who disagreed or strongly disagreed suggests that the program effectively met the educational objectives and fulfilled participants' expectations. Overall, the positive feedback from the post-demonstration quiz underscores the success of the CPR program in disseminating essential knowledge and skills related to cardiopulmonary resuscitation.

In the next question participants were asked to **indicate their understanding of CPR**. The responses are as follows:

A. Agree: 11,341 participants
B. Hands-on training is a must: 8,125 participants
C. Not understood: 499 participants
D. Strongly agree: 98,530 participants

The majority of participants, **totaling 109,466 (96.4%) individuals, either agreed or strongly agreed with their understanding of CPR.** Additionally, a significant number of participants, 8,125 individuals, recognized the importance of hands-on training in CPR, emphasizing the practical aspect of acquiring CPR skills. However, a small portion of participants, 499 individuals, expressed that they did not fully understand CPR.

The responses indicate a widespread understanding and acknowledgment of CPR among the participants, with an emphasis on the necessity of hands-on training for effective skill acquisition. The majority's strong agreement suggests confidence in their grasp of CPR concepts, reinforcing the program's success in imparting essential knowledge and practical skills related to cardiopulmonary resuscitation.

Reflecting on the administration of future CPR programs, participants were asked to **provide feedback on potential improvements**. The responses regarding the necessity of refresher courses are as follows:

A. Annual refresher course is required: 33,267 participants
B. Cannot comment: 8,130 participants
C. No refresher course is required: 3,826 participants
D. Refresher course every six months is required: 68,272 participants

The majority of participants, totaling **101,539 (89.5%) individuals, advocated for the implementation of refresher courses**, with 68,272 specifically suggesting a refresher course every six months. This response underscores the recognition of the importance of maintaining and updating CPR skills regularly to ensure proficiency and readiness in emergency situations.

Additionally, a significant portion of participants, **33,267 (29.2%) individuals, endorsed the need for annual refresher courses**, indicating a consensus on the value of ongoing education and skill reinforcement. However, it's noteworthy that a substantial number of participants, 8,130 individuals, refrained from commenting, suggesting a potential area for further engagement or clarification regarding the necessity and frequency of refresher courses.

Conversely, a smaller group of participants, 3,826 individuals, expressed the opinion that no refresher course is required. While this viewpoint represents a minority, it still highlights the importance of considering diverse perspectives and addressing any concerns or misconceptions regarding the necessity of ongoing CPR training.

Based on the responses provided, the interpretation of the ratio of chest compressions to breaths when providing CPR to an adult can be determined as follows:

A. 10 compressions to 2 breaths: 5,183 respondents
B. 100 compressions to 2 breaths: 3,842 respondents
C. 15 compressions to 2 breaths: 6,399 respondents
D. 30 compressions to 2 breaths: 98,071 respondents

The majority of respondents, totaling 98,071 (86.4%) individuals, indicated that the ratio of chest compressions to breaths when providing CPR to an adult is 30 compressions to 2

breaths. **This response aligns with the standard CPR guidelines, which recommend a ratio of 30 compressions to 2 breaths for adult patients.**

While other ratios were provided by a smaller number of respondents, such as 10 compressions to 2 breaths, 100 compressions to 2 breaths, and 15 compressions to 2 breaths, these ratios are not consistent with widely recognized CPR protocols. Therefore, the majority consensus on the ratio of 30 compressions to 2 breaths suggests a clear understanding among respondents of the recommended CPR technique for adults.

Based on the responses provided, the interpretation regarding which of the following is not a component of Cardiopulmonary Resuscitation (CPR) is as follows:

A. Airway: 760 respondents
B. Breathing: 1,235 respondents
C. Chest compressions: 5,316 respondents
D. Providing food: 90,760 respondents

The majority of respondents, totaling 90,760 (80%) individuals, identified "Providing food" as not being a component of CPR. This response is correct, as providing food is not a component of CPR. Instead, CPR primarily involves three main components: maintaining an open airway, providing rescue breaths (breathing), and performing chest compressions. These components aim to restore circulation and oxygenation to a person in cardiac arrest.

While smaller numbers of respondents identified "Airway" and "Breathing" as not being components of CPR, these responses are incorrect. In CPR, establishing and maintaining an open airway to ensure the passage of air into the lungs and providing rescue breaths are essential components of the technique.

Therefore, the consensus among respondents regarding "Providing food" as not being a component of CPR reflects a clear understanding of the key components of this life-saving technique.

Based on the responses provided, the interpretation regarding how long one rescuer should do the chest compression in one go as part of a multi-rescuer team is as follows:

A. 2 min: 74,119 respondents
B. 3 min: 10,384 respondents
C. 4 min: 3,904 respondents
D. 5 min: 25,088 respondents

The majority of respondents, totaling 74,119 (65.3%) individuals, indicated that one rescuer should do chest compressions for 2 minutes in one go as part of a multi-rescuer team. This response aligns with standard CPR guidelines, which recommend rotating chest compressors every 2 minutes to prevent rescuer fatigue and maintain effective compression quality.

While smaller numbers of respondents selected longer durations, such as 3 minutes, 4 minutes, and 5 minutes, these responses are not consistent with widely recognized CPR protocols. Prolonged periods of chest compressions by a single rescuer may lead to decreased effectiveness and fatigue, which can compromise the quality of CPR delivery.

Based on the responses provided, the interpretation of what a single rescuer with just awareness and basic training of CPR, and no available equipment, should do when witnessing a

cardiac arrest in an adult until help arrives is as follows:

A. Do chest compressions only: 14,670 respondents
B. Do rescue breathing only: 2,864 respondents
C. Don't try to help him: 2,666 respondents
D. Try full CPR with 30 chest compressions: 93,295 respondents

The majority of respondents, totaling **93,295 (82.2%) individuals, correctly identified that a single rescuer should perform full CPR, including 30 chest compressions, until help arrives. This response aligns with standard CPR guidelines, which emphasize the importance of immediate chest compressions to maintain blood flow and oxygenation to vital organs in the event of a cardiac arrest.**

While smaller numbers of respondents selected alternative actions, such as performing chest compressions only or rescue breathing only, these responses do not fully adhere to standard CPR protocols. Chest compressions are prioritized in CPR protocols due to their critical role in sustaining circulation and increasing the likelihood of survival.

Additionally, a small number of respondents suggested not trying to help the individual experiencing cardiac arrest. However, it is essential for any bystander witnessing a cardiac arrest to intervene and provide assistance to the best of their ability, as prompt CPR can significantly improve the chances of survival.

Therefore, the consensus among respondents regarding the importance of performing full CPR, including 30 chest compressions, underscores a clear understanding of the recommended actions for a single rescuer in the event of witnessing a cardiac arrest in an adult until help arrives.

Conclusion

The post-CPR demonstration quiz yielded positive feedback regarding the program's effectiveness and educational value. Among the participants:

A significant majority, 98.2% individuals, either agreed or strongly agreed that the CPR program was informative and educative. The majority of participants, 96.4% either agreed or strongly agreed with their understanding of CPR. A substantial number of participants recognized the importance of hands-on training in CPR, emphasizing the practical aspect of skill acquisition. The majority of participants 89.5% advocated for the implementation of refresher courses, with a significant number suggesting refresher courses every six months. This feedback underscores the recognition of the importance of maintaining and updating CPR skills regularly to ensure proficiency and readiness in emergency situations.

The majority of respondents 86.4% indicated a ratio of 30 compressions to 2 breaths when providing CPR to an adult, aligning with standard CPR guidelines. Participants demonstrated a clear understanding of the components of CPR, with the majority 80% correctly identifying "Providing food" as not being a component of CPR. The majority 65.2% of respondents indicated that one rescuer should perform chest compressions for 2 minutes in one go as part of a multi-rescuer team, consistent with standard CPR guidelines.

The positive feedback and understanding demonstrated by participants reflect the success of the CPR program in

disseminating essential knowledge and skills related to cardiopulmonary resuscitation. These insights provide valuable guidance for future CPR training programs, emphasizing the importance of effective educational delivery, hands-on training, and regular skill maintenance.

Acknowledgement

The NBEMS extends its heartfelt thanks and gratitude for their immense contribution to NBEMS – CPR awareness program to:

1. Ministry of Health and Family Welfare (MoHFW)
2. Governing Body of National Board of Examinations in Medical Sciences (GB-NBEMS)
3. National Medical Commission (NMC)
4. Dental Council of India (DCI)
5. Pharmacy Council of India (PCI)
6. Indian Nursing Council (INC)
7. NBEMS Accredited Institutions and Hospitals
8. Indian Medical Academy (IMA)
9. Indian Association of Physiotherapy (IAP)
10. Society for Emergency Medicine in India (SEMI)
11. Guru Gobind Singh Indraprastha Universiy, Delhi
12. Allen Career Institute, Kota, Rajasthan
13. Tata Consultancy Services Ltd. (TCS)
14. Sir Ganga Ram Institute of Post-graduate Medical Education and Research
15. Agrawal Siksha Samithi, Hyderabad
16. Hemwati Nandan Bahuguna Uttrakhand Medical Education University, Dehradun
17. All Participating Colleges/Institutions/Organizations
18. Shri Amit Arora (Video Credit)

Conflicts of interest

The authors declares that they do not have conflict of interest.

Funding

No funding was received for conducting this study.

References

1. Alqahtani MS, Abbas M, Alsabaani A, Alqarni A, Almohiy HM, Alsawqaee E, Alshahrani R, Alshahrani S. The Potential Impact of COVID-19 Virus on the Heart and the Circulatory System. Infect Drug Resist. 2022 Mar 22;15:1175-1189.
2. Betty Raman, David A. Bluemke, Thomas F. Lüscher, and Stefan Neubauer. Long COVID: post-acute sequelae of COVID-19 with a cardiovascular focus. Eur Heart J. 2022; 43(11): 1157–1172.
3. Shrestha AB, Mehta A, Pokharel P, Mishra A, Adhikari L, Shrestha S, Yadav RS, Khanal S, Sah R, Nowrouzi-Kia B, Padhi BK, Chattu VK. Long COVID Syndrome and Cardiovascular Manifestations: A Systematic Review and Meta-Analysis. Diagnostics (Basel). 2023 Jan 29;13(3):491.
4. Global status report on road safety 2023. Geneva: World Health Organization; 2023. Licence: CC BY-NC-SA 3.0 IGO.
5. Yogima Seth Sharma. 19 people died every hour in road accident in India last year. The Economic Times. Oct. 31, 2023