

Bystander cardiopulmonary resuscitation: Equipping communities to save lives

Mani G.*, Danasekaran R, Annadurai K.

Department of Community Medicine, Shri Sathya Sai Medical College and Research Institute, Kancheepuram District, Tamil Nadu, India

ABSTRACT

Majority of the occurrences of cardiac arrest happen outside the hospital and are associated with poor survival due to delay in recognition and provision of early cardiopulmonary resuscitation (CPR). Bystanders are often the first witness to these occurrences. Early CPR provided by trained bystanders would play an effective role in saving

the patient through the golden hour. So equipping them with CPR knowledge and skill will empower them to act in times of need and improve outcomes in cardiac arrest.

Key words: Cardiac arrest, out of hospital, bystander cardiopulmonary resuscitation

***Corresponding sauthor:**

Geetha Mani

Plot no. 428, Arul Nagar, Nandhivaram Guduvancheri

Kancheepuram District

Tamil Nadu, India

Tel.: +919444220555

e-mail: drgeethamm@gmail.com

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Bystander Cardiopulmonary resuscitation: Equipping communities to save lives Out-of-hospital Cardiac arrest: Introduction

Out-of-Hospital cardiac arrest (OHCA), are those cardiac arrest events which occur outside the healthcare settings and cause considerable morbidity, mortality and a substantial burden on the health care system. Cardiac causes account for approximately three-fourths of these events [1]. Acute coronary syndrome and coronary vasospasm are the commonest causes among elderly and young individuals respectively. Various non-cardiac causes also contribute to OHCA, the commonest being trauma, drowning, drug overdose, asphyxia, electrocution and primary respiratory arrest [2].

Out of Hospital Cardiac arrest: Bystander's role

OHCA is an important public health problem because the probability of recovery is small though the process is potentially reversible [1]. Outcomes after OHCA as measured by survival rate and cerebral performance category are dismal compared to In-hospital cardiac arrest due to delay in recognition and provision of essential care [1]. In case of an OHCA, initial care in the first few critical minutes which includes CPR and use of an automated external defibrillator (AED) depends on the actions of the bystanders [3]. Bystander has a significant role in identification of the event and the victim's need for assistance, calling the emergency helpline number, carrying out the dispatcher's instructions and performing CPR [4].

Bystander CPR: The concept and statistics

Bystander CPR has been recognized as a vital link in improving survival of OHCA victims by two to three times [4,5]. The time interval between collapse to initiation of CPR, type of CPR administered namely conventional or chest compression-only CPR are important factors which greatly influence the outcomes following bystander assisted OHCA in addition to other factors such as health-related quality of life before arrests, location of arrest and cardiac rhythm at arrest [4,6-9]. Komatsu et al. [10] has reported that bystander CPR is a significant pre-hospital contributory factor in the survival and neurological outcomes in post-cardiac arrest syndrome following OHCA. Chan et al. [11] in their analysis on recent trends of OHCA survival in the United States demonstrate the potential role of bystander CPR in pre-hospital survival of OHCA which further positively influences the overall survival.

Hence, it is essential that CPR knowledge and adequate training be imparted to the common man to enable them play an effective role in saving the patient through the initial precious minutes. In adult OHCA, bystanders performing chest compression only CPR is considered to be as

effective as conventional CPR. Compression only CPR can be easily performed even by untrained bystanders [9]. Recent OHCA statistics available from few developed countries report low bystander CPR rates. Less than 50% of the occurrences received bystander CPR, 40.1% and 42% in United States and France respectively [10,11]. Studies on OHCA from Germany, Singapore and Taiwan reported bystander CPR rates between 15% and 22.9% [12-14]. Rajaram et al. [8] reported a bystander rate of 4.4% in OHCA in a study from urban India. Recent published literature have analysed the trends in bystander rates in population-based, prospective cohort studies. The trends in bystander rates as documented by OHCA related registries from United States (28.7% increase from 2005-2012) and Netherlands (increased by 23% from 2006-2012) reveal significantly positive trends which are encouraging [11,15-18].

Kitamura et al. [9] in their nationwide, 5-year prospective population study on OHCA's demonstrated a 2-fold increment in 1 month survival; with favourable neurological out-comes in OHCA's with effective bystander CPR. Similar significant improvement in survival outcomes has also been observed in a population-based cohort study from 2006 to 2012 by Blom et al. in Netherlands [18].

Despite OHCA being a potential public health problem, there is a deficit of research exploring the burden of OHCA and role of bystander CPR in survival of these cases in many other countries of the world.

Bystander CPR as a public health measure: Challenges and solutions

The overall low prevalence of bystander CPR brings to attention the various obstacles in implementing this as an effective public health measure to improve survival rates. On an average only one-third of OHCA receive bystander CPR [13]. Studies from various countries reveal less than adequate, resuscitation-related knowledge and competence among health care personnel. The level of knowledge among common people is even lesser [19]. The following are the commonest reasons cited from various studies to explain the bystanders' reluctance to initiate CPR- sense of panic, concern for harming or injuring the victim further, fear of liability, fear of inadequate knowledge or incorrect performance of the technique, fear of transmission of communicable diseases through mouth-to-mouth ventilation, victim characteristics and region-specific sociocultural characteristics [5,17, 20, 21].

Strategies to improve bystander CPR must enable timely and comprehensive identification of cardiac arrest, encourage and empower bystanders to act, and help ensure effective CPR [17].

Table 1 summarises the challenges in implementing bystander CPR as a public health measure from the bystanders' and the policy-makers' perspective and possible solutions.

Table 1. Improving bystander CPR rates: challenges and solutions.

Challenges	Solutions
Bystanders perspectives	
Lack of motivation [5, 17, 21]	Widespread media campaigns and health education programmes promotion of early response and assistance from Emergency medical services. Mandatory CPR training as part of issuing or renewing driver's licence; as part of higher secondary education completion [23]
Failure to recognise cardiac arrest [5]	Widespread media campaigns and health education programmes, Simplification of arrest identification [22] Regionally developed user-friendly flow-charts describing the signs and symptoms of cardiac arrest and step-wise actions to impart basic knowledge
Reluctance to perform mouth-mouth ventilation due to the intimacy of the act and fear of transmission of infectious diseases [5, 17]	Chest compressions only CPR [22] Reassurance [23]
Complexity of resuscitation guidelines [5,22]	Just-in-time' dispatcher assisted CPR [22]
Poor retention of knowledge and skills [24]	Periodic refresher training, Dispatch-assisted CPR instructions, promoting self-training modules and videos [23] Encouraging self-practising on manikins [23]
Fear of failure and lack of confidence [25]	Community-level CPR training Virtual learning methods for eligible groups
Fear of legal liability [5]	Reassurance and suitable legislations to protect bystander resuscitators Creating awareness about the central toll-free helpline numbers for immediate assistance [24] Empowering with knowledge to activate the Emergency Medical services at the earliest [24]
Psychological stress associated with witnessing a cardiac arrest [20]	Post-event psychological counselling for the rescuer and the bystanders [20]
Policy maker's perspectives	
Lack of adequate epidemiological data	Epidemiological registries of OHCA's, similar to Cardiac Arrest Registry to Enhance Survival (CARES) in United States and Amsterdam Resuscitation Study (ARREST) in The Netherlands [2, 18] Identification of neighbourhood characteristics, bystander characteristics, bystander CPR rates Common database for notification of OHCA's encountered by hospitals and physicians Use of Geographic Information System (GIS) to locate OHCA's, identify the associated factors and use of information to improve bystander CPR rates [26]
Implementation of training programmes	Separate modules for fresher courses and refresher courses Separate modules for specific to the various training groups like students, public and health professionals Assistance to corporate and government organisations to identify and employ of feasible initiatives to train employees Engaging professional organisations School curriculum-based training on basic life support [27] BLS training should be imparted as part of training of scouts, guides and cadet corps Effective co-ordination between professional organisations, non-governmental organisations and regional health institutions in implementation of training courses and provision of bystander assistance in OHCA's CPR training in potential vacation spots Web based interactive applications Smart phone user friendly applications
Identification of potential groups to impart CPR training	Family members of cardiac patients, utilisation of consultation and follow-up sessions to provide CPR training for first-degree relatives and caregivers [23] Providing CPR courses as part of teacher training and driving schools

In conclusion, Bystander CPR applied under right circumstances could mean the difference between life and death. Equipping people with this vital skill empowers them to act in times of emergency and would greatly improve survival rates and neurological outcomes in OHCA events.

Conflicts of Interest

None declared.

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