

# Community Initiatives of OHCA

Subjects: [Emergency Medicine](#)

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Early intervention of bystanders (the first links of the chain of survival) have been shown to improve survival and good neurological outcomes of patients suffering out-of-hospital cardiac arrest (OHCA). Many initiatives have been implemented to increase the engagement of communities in early basic life support (BLS) and cardiopulmonary resuscitation (CPR), especially of lay people with no duty to respond.

basic life support

community initiatives

outcome

out-of-hospital cardiac arrest

## 1. Introduction

In out-of-hospital cardiac arrest (OHCA), the first three links of the chain of survival <sup>[1]</sup> are referred to as basic life support (BLS), and include early recognition of cardiac arrest, calling the local emergency service <sup>[2]</sup>, providing bystander cardiopulmonary resuscitation (CPR, i.e., chest compressions with or without rescue ventilations) <sup>[3]</sup>, and retrieval and use of an automated external defibrillator (AED) <sup>[4]</sup>. When applied rapidly, these BLS interventions offer the greatest chance of OHCA survival and good neurological outcomes <sup>[5]</sup>. However, the delivery of these interventions is still far from optimal, with only ~80% of OHCA recognized, and large regional variation in rates of bystander CPR and AED use <sup>[6][7][8]</sup>. Over the past two decades, many interventions aiming to improve the engagement of lay people with no formal duty to respond to OHCA have been tested and are now recommended in international guidelines. Examples include dispatcher-assisted CPR, public access defibrillation (PAD) programs, and AED dissemination including drones' deployment, simplification of CPR (i.e., chest compressions only CPR), and apps to localize and engage first responders and/or the nearest AED <sup>[9]</sup>. What is less understood is the impact of other community-based initiatives aiming to improve CO-CPR rates, especially those which promote or provide public BLS education and training <sup>[9]</sup>.

## 2. Initiatives

### 2.1. Community Training Programs

Regarding the studied initiatives, training by the mean of instructors has been widely used as an alone or combined intervention. Chest compression-only CPR has been the most frequent content of training, since it is a reasonable alternative to standard CPR (compressions plus ventilations) and can be easier to learn <sup>[10]</sup>.

Instructor-led training can be considered the most common way to disseminate BLS skills. It is usually deployed during a BLS course, but instructors can teach BLS even in targeted contexts (public places, schools, families,

workplaces) and in a shorter time. Instructor-led training was the only teaching intervention [\[11\]\[12\]\[13\]\[14\]\[15\]](#) or the first tier of a training program to start peer-to-peer training with the adjunct of self-learning videos [\[16\]\[17\]\[18\]](#).

Interestingly, when intervention training is delivered as a “single shot”, not in a program context and with no specific targets [\[16\]\[14\]](#), or as time-limited initiative with a short follow up [\[19\]](#), the interventions do not seem to impact on outcomes. In general, all targeted and multiple sessions programs were able to increase at least bystander CPR.

When initiatives included schools or family members [\[11\]\[12\]\[15\]](#), survival increased as well as bystander CPR, with the exception of the study by Isbye et al. [\[19\]](#). Furthermore, programs which engaged students as a second-tier trainers [\[16\]\[19\]](#) with a self-learning kit were able to increase the proportion of trained people (with a ratio of 4.9 and 2.5 respectively).

## 2.2. Mass Media Campaigns

Media campaigns as a sole initiative [\[20\]](#) or as an adjunct to community training programs [\[21\]\[17\]\[18\]](#) contributed to increase bystander CPR rates, but the evidence on survival is conflicting. Interestingly, despite mass media (television, radio, newspapers, and magazines) being considered the most obvious way to spread messages and promote change in behavior [\[22\]](#), the search was able to only find a small number of published studies evaluating their impact. Furthermore, researchers did not find studies including social media which have recently reached a prominent position in influencing opinions, attitudes, and practices. Focus-designed communication strategies have been successfully implemented in many areas of public health to reach targeted improvement and should be considered even in the field of bystander CPR [\[23\]\[24\]](#). A specific analysis of studies addressing social media as a tool of public campaigns could add useful information.

## 2.3. Bundled Interventions

researchers found that bundled interventions, targeting different components of the “chain of survival”, can improve OHCA survival [\[25\]\[26\]\[27\]\[28\]](#) probably better than isolated ones; however, it is difficult to isolate the effect of each single component of the program on outcomes. This aspect has been highlighted in a recent systematic review and meta-analysis [\[29\]](#), which investigated the effect of community initiatives on survival to discharge or 30-day survival and on bystander CPR rate, finding an improvement in both outcomes (OR, 1.34; 95% CI, 1.14–1.57; I2 = 33% and OR, 1.28; 95% CI, 1.06–1.54; I2 = 82%, respectively). In that review, the authors classified the interventions in community initiatives alone (five studies) and in initiatives that were combined with changes in health care services (ten studies). Community plus health service interventions were associated with a greater bystander CPR rate compared with community alone initiatives, while survival rate did not differ. However, many of the included studies involved non-health professionals with a duty to respond, such as firefighters and policemen, thus confounding the effect of interventions on their ability to engage occasional bystanders, intended as laypeople with no role in the emergency response systems. Interestingly, a restricted analysis on studies targeting laypeople only confirmed a positive association with increased bystander CPR. Nevertheless, in four out of nine of the studies included in this sub analysis, CPR training was associated with a notification system which, by definition, addresses laypeople who adhere to an organized response system on a volunteer basis, such as a “first responder system”. In contrast, the

present scoping review excludes this kind of study, with the purpose of investigating and highlighting the effect of community initiatives on the willingness of general population to provide CPR at an earlier stage than the involvement in a first responders program.

### 3. Outcomes

With respect to outcomes, bystander CPR rate was reported in almost all the included studies, and, in most of them, it showed a benefit with the implementation of the intervention. This benefit was more frequent when the type of initiative was a 'bundle' of interventions compared to single training or mass-media initiatives.

There was insufficient evidence regarding the impact of community initiatives on other outcomes, such as survival with good neurological outcome, one-month survival, ROSC, and time to first compression, either because studies did not report them, or because these outcomes could be impacted by other initiatives that go beyond the objectives of this review. A benefit in survival at hospital discharge was reported in only 40% of studies that assessed this outcome. In these studies, it is difficult to establish an association between improved bystander CPR rate and improved survival, as the latter is probably multifactorial and most likely related to improvements in all the links of the chain of survival [\[11\]](#)[\[12\]](#)[\[15\]](#).

In the case of studies assessing bundled interventions, many outcomes were reported that could not be included in the narrative analysis, since it was impossible to isolate which specific intervention (respecting the inclusion and exclusion criteria) was associated with which outcome.

Therefore, since clinical outcomes such as ROSC or survival at any time can be affected substantially by patients' conditions and emergency response system performance, researchers suggest considering bystander CPR rate as the most consistent and appropriate outcome to reflect the effectiveness of community initiatives as intended in the present review. In fact, bystander CPR rate is the only outcome completely dependent on laypeople willingness to intervene, and thus the more directly related with the implemented intervention.

However, it should be considered that community interventions to promote BLS and their effectiveness are context-specific and can be affected by individual characteristics, cultural sensitivity, medico-legal environment, and training method and quality. In fact, non-targeted approaches, and the training sites selection without consideration of the actual need for BLS learning in corresponding communities, have shown to lack efficacy [\[19\]](#). Community initiatives aimed at public engagement demand multidisciplinary competencies in the project phase (such as experts in communication, social marketing, and public health programs) and significant investment of both human and financial resources for their deployment. Simplicity and brevity of the community training programs were important characteristics to allow for maximal efficiency and the training of individuals who do not wish to participate in a longer course or seek BLS certification [\[26\]](#). These interventions may be particularly helpful when targeting areas with high OHCA incidence and low bystander CPR rates, which have also been shown to have low rates of CPR training [\[30\]](#), including lower socioeconomic status neighborhoods, since they can require lower costs and less time commitment [\[21\]](#). In this context, BLS educational interventions addressing high-school students were

identified as an important component, since they may disseminate CPR knowledge beyond the classroom, and reach into low-income, minority neighborhoods [16][19].

Public health initiatives to improve bystander CPR and early defibrillation are associated with better outcomes for OHCA at home, where the prognosis has traditionally been poor [12]. Included studies underline the fact that multiple, multifaceted, and community-wide programs using training, media, advertisement materials, and public presentations may be needed to increase bystander CPR in the communities [25][26][27][28].

Based on the results of this scoping review and the narrative summary, implementation of community initiatives such as BLS training involving a large portion of population or bundled interventions can be considered to improve the bystander CPR rate among laypersons in cases of OHCA. Furthermore, this scoping review provided information about different types of community initiatives that have been implemented in an attempt to improve bystander CPR. It might additionally offer suggestions to communities' leaders, decision-makers, and other stakeholders to structure and implement policies and guidelines to engage laypersons in resuscitation to improve the outcomes of OHCA.

## 4. Knowledge Gaps

Despite not being a systematic review, this scoping review highlights important knowledge gaps, such as the need for more studies on this topic, more rigorously designed RCTs regarding this issue and studies on children. Furthermore, future studies should document outcomes such as survival with good neurological outcome, survival to discharge (hospital discharge and one-month survival), ROSC, and time to first compression. Specifically, researchers identified:

Data limited to only some geographical areas, which is a result of the published literature and a lack of evidence regarding community initiatives to promote BLS implementation in some countries;

A need for more high-quality studies, especially RCTs in order to have more robust evidence and outcomes adjusted for the main confounders;

A need to evaluate the effect of public campaigns (World Restart A Heart—WRAH), and BLS teaching at school (Kids Save Life—KSL) on BLS training implementation, bystander CPR, and clinical outcome;

A need to evaluate the effect of specific legal regulations in different countries, which can facilitate BLS deployment of general population with the support of EMS-dispatchers;

No studies evaluated regional initiatives specifically for BLS in children or implementation programs including children in the chain of survival;

A need to isolate the specific interventions that are associated with the improvement or not of each specific outcome in studies assessing the impact of bundled interventions;

A need to investigate the cost-effectiveness of any single intervention and their specific impact on clinical outcomes.

## 5. Limitations

This work has some limitations. First it is a scoping review, thus it does not have the methodological rigorousness of a systematic review; and therefore, no recommendations regarding interventions are possible. As any review, it may be susceptible to a selection bias, since there may be articles that the search strategy might not have identified. Additionally, there are different definitions of “community initiatives” and therefore any review would face difficulties to get all relevant studies.

Moreover, many included articles reported limits in the conduct of the studies, such as missing data on CPR quality, as well as information on bystanders, including age, sex, occupation, and BLS training experience. Given the observational nature of most of the studies, causality cannot be determined, despite finding associations. Moreover, unmeasurable or unmeasured confounders could explain improved temporal outcomes independent of public health initiatives. In fact, only a few studies controlled for the main variables that could confound the association between community initiatives and OHCA outcomes. Finally, studies assessed the role of bundled interventions in an aggregate way, thus it was not possible to determine how much each single initiative contributed to the changes observed in the outcomes of interest.

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