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Mobile phone dispatch of volunteer lay responders in out-of-hospital cardiac arrest

BACKGROUND

Annually some 6000 cases of out-of-hospital cardiac arrest (OHCA) are reported to the Swedish register for cardiopulmonary resuscitation. Survival is about 10%. Emergency medical services delay has increased over the last decade and onsite automated external defibrillators (AEDs) are seldom used. With the development of mobile positioning, dispatch of willing and able nearby volunteer lay responders to suspected OHCA through mobile applications, has potential to increase cardio-pulmonary resuscitation rates and facilitate early defibrillation. Recent guidelines from the European Resuscitation Council recommends the use of technology to engage communities through mobile phone technology to alert willing bystanders to nearby events. (1)

STEPS TAKEN

During 2010 a first version of a system alerting volunteer lay responders to suspected OHCA was launched in Stockholm. The technology was based on the Global System for Mobile Communications (GSM) where text was sent via short message service to about thousand users in Stockholm, Sweden. In 2016 a mobile application was launched integrating a live map showing the nearest available AED and the closest route to the victim. The development of a smartphone application made the dissemination and the scalability of the system easier. The numbers of users increased to four thousand and the system was implemented in other regions. About half of the Swedish regions are using the system in 2022, and it has also been introduced throughout Denmark.

RESULTS

In a randomized study we evaluated the GSM system from April 2012 to December 2013. Totally 9828 volunteer lay responders responded to 667 OHCA alerts, 46% in the intervention group and 54% in the control group. The rate of CPR was higher, 62% (188/305) in the intervention group as compared to 48% (172/360) in the control group, an absolute difference of 14 % points (95% CI, 6-21; $P < 0.001$). (2)

A follow-up study explored the emotional responses, posttraumatic stress reactions and levels of wellbeing amongst 1471 volunteer lay responders exposed/dispatched to OHCA alerts and compared experiences to 915 unexposed control individuals. The study found that the lay responders who were dispatched rated the experience as mainly positive, no adverse effects were reported. The exposed groups had low posttraumatic stress scores and high-level general wellbeing at follow-up. (3)

Preliminary results from an unpublished randomized trial evaluating dispatch of lay responders through a smartphone application suggest that the system facilitates an increase in bystander CPR and the use of AEDs.

OUTLOOK

Besides the Heartrunner system available in Sweden and Denmark, similar systems are operational in other countries such as in the UK (GoodSAM), US (PulsePoint), the Netherlands (SMS-service and app) and in Switzerland (Ticino). A recent pooled random effect estimate with data from mobile positioning systems in Sweden, Denmark, the northern parts of the Netherlands, and Switzerland, of 4872 activated cases compared with 4692 non-activated cases, showed a 23% increase in survival (95% CI: 1.09-1.38) (unpublished findings).

CHALLENGES

Dispatch of volunteer lay responders by mobile phone technology is feasible and increases bystander CPR and defibrillation. There are still challenges at the dispatch centers to optimize the system to its full extent. Firstly, the suspected OHCA must be identified early, second, the mobile systems need to be triggered at an early stage, at the same time as EMS-resources. Third, knowledge about recruiting volunteers to OHCA of different etiology is lacking, i.e., drownings, children, trauma etc. in relation to both safety and effect. Fourth, more AEDs must be available 24-7 and reported to AED registries.

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