CARDIAC RESUSCITATION

Improving outcomes after out-of-hospital cardiac arrest

Timely response and initiation of cardiopulmonary resuscitation (CPR) is critical to survival rates after an out-of-hospital cardiac arrest. In two studies published in the *New England Journal of Medicine*, a team from Sweden shows that mobile-telephone technology can be used to recruit members of the public who are trained in CPR to the scene of a cardiac arrest, and that early response is associated with an improvement in 30-day survival.

“There is a need for new ways that could increase bystander CPR rates,” says Dr Mattias Ringh, one of the study investigators. “We therefore wanted to design and evaluate a system that could recruit nearby help within the first few minutes after an out-of-hospital cardiac arrest.” Accordingly, a blinded, randomized, controlled trial with a total of 9,828 lay volunteers trained in CPR was performed in Stockholm, Sweden. During the study period (April 2012 to December 2013), 1,808 suspected cases of out-of-hospital cardiac arrest occurred. A mobile-phone positioning system was activated when the emergency services were dispatched. The system was used to locate any trained volunteers who were within a 500 m radius of the location of the cardiac arrest, and who were then either dispatched to the patient (intervention group) or not dispatched (control group).

“The sooner defibrillation can be performed, the better the chance of survival...”

Of the individuals with suspected cardiac arrest, those who were not treated by the emergency services or who turned out not to have cardiac arrest were excluded from the final analysis. Overall, 667 patients were included: 46% in the intervention group and 54% in the control group. In the intervention group, 61.6%

received CPR initiated by a bystander, compared with 47.8% in the control group (between group difference 13.9 percentage points, 95% CI 6.2–21.2, $P < 0.001$). Use of the mobile-phone dispatch system was associated with an increased likelihood that CPR would be initiated before the arrival of the medical services (OR 1.7, 95% CI 1.2–2.5). No significant differences were observed in the secondary outcomes of rate of return of spontaneous circulation, initial cardiac rhythm, or 30-day survival; however, the study was not powered to detect differences in these outcomes, which would require a much larger patient population.

“Traditional methods such as mass public training are important, but have not shown any evidence of a similar increase in the rates of bystander CPR,” says Dr Jacob Hollenberg, a co-investigator in the study and head of research at the Center for Resuscitation Science at the Karolinska Institutet, Sweden. “The new mobile phone text messaging alert system shows convincingly that new technology can be used to ensure that more people receive life-saving treatment as they wait for an ambulance.”

The investigators state that the system now includes 14,000 volunteers, and they plan to launch an updated service using GPS technology that will be used both to dispatch the closest volunteers and to locate the nearest public automated external defibrillator, which is important because they believe that “the main effect of CPR is probably indirect, in that it may prolong the time window for defibrillation. The sooner defibrillation can be performed, the better the chance of survival.”

The benefit of early CPR has been demonstrated in a second study from the same group of investigators. In this study, they analysed the 30,381 out-of-hospital cardiac arrests witnessed in Sweden between 1 January 1990 and 31 December 2011. In Sweden, >3 million

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of the 9.7 million population have received CPR training in the past 3 decades.

CPR was performed before the arrival of the emergency services in 51.5% of cases, and 30-day survival in these patients was 10.5%. When CPR was not performed before the arrival of the emergency services (48.9% of patients), 30-day survival was 4.0% ($P < 0.001$). Therefore, CPR initiated before the arrival of emergency services was associated with an increased rate of 30-day survival (OR 2.15, 95% CI 1.88–2.45), particularly among men, and when the cardiac arrest occurred in a public place rather than the patient's home. Importantly, the survival rate decreased with an increase in the time to initiation of CPR. The investigators note that “the use of therapeutic hypothermia, coronary revascularization, and implantable cardioverter–defibrillators has been implemented in recent years, which may confound our results”. Taken together, Hollenberg believes that the new system of mobile alerts will “increase not only the proportion of bystander CPR, but also empower early defibrillation and survival”.

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Original articles Ringh, M. *et al.* Mobile-phone dispatch of laypersons for CPR in out-of-hospital cardiac arrest. *N. Engl. J. Med.* 372, 2316–2325 (2015) | Hasselqvist-Ax, I. *et al.* Early cardiopulmonary resuscitation in out-of-hospital cardiac arrest. *N. Engl. J. Med.* 372, 2307–2315 (2015)