



Bystander CPR for out-of-hospital cardiac arrest

A Swedish cohort study found that bystander cardiopulmonary resuscitation (CPR) doubled the likelihood of survival in people who experienced out-of-hospital cardiac arrest.

Overview:

- In Sweden, cardiopulmonary resuscitation (CPR) by a bystander before arrival of emergency medical services doubled the likelihood of survival in people who experienced out-of-hospital cardiac arrest.
- These findings reinforce Resuscitation Council (UK) recommendations that everyone who is able to should learn CPR and how to use an automated external defibrillator (AED).



Background: In England, an estimated 28,000 people experience out-of-hospital cardiac arrest and undergo resuscitation by ambulance staff each year ([Perkins et al. 2015](#)). The proportion of these people who survive and go home from hospital is 7–8%.

Bystander CPR can increase the likelihood of survival from out-of-hospital cardiac arrest ([Wissenberg et al. 2013](#)). The current rate of initial bystander CPR in England is reported as being around 40–50% ([Perkins et al. 2015](#)).

Current advice: Guidance on [adult basic life support and automated external defibrillation](#) from the Resuscitation Council (UK) ([NICE accredited](#)) makes a number of recommendations to improve survival from out-of-hospital cardiac arrest, such as:

- Everyone who is able to should learn CPR.
- All school children should be taught CPR and how to use an AED.
- Defibrillators should be available in places with large numbers of people (for example, railway stations and shopping centres); where there is an increased risk of cardiac arrest (for example, gyms and sports facilities); or where access to emergency services can be delayed (for example, aircraft and other remote locations).

New evidence: [Hasselqvist-Ax et al. \(2015\)](#) used national cohort data to assess whether CPR before the arrival of emergency medical services improved survival in people with out-of-hospital cardiac arrest.

Data were obtained from the Swedish Cardiac Arrest Registry on all cases of out-of-hospital cardiac arrest that were witnessed by bystanders and treated by emergency medical services. Cases were included in the registry if the person was not breathing and had no signs of circulation, and if CPR, defibrillation or both were started.

A total of 61,781 people who had out-of-hospital cardiac arrest were included in the registry between 1990 and 2011. This analysis assessed 30,381 people who had bystander-witnessed cardiac arrest and had data available on both the start of CPR and survival. Of these people, around half (51.1%) received CPR before the arrival of the emergency medical services.

The 30-day survival rate was 10.5% among people with out-of-hospital cardiac arrest who received CPR before the arrival of emergency medical services, and 4.0% among those who did not ($p < 0.001$). The survival rate decreased in line with time from collapse to start of CPR, with the rate 15.6% among people who received CPR within 3 minutes and 0.9% in people who received CPR after 15 minutes or more.

In analyses adjusted for variables such as place of cardiac arrest and time until arrival of emergency medical services, people who received bystander CPR were twice as likely to survive to 30 days than people who did not (odds ratio=2.15, 95% confidence interval 1.88 to 2.45, $p < 0.001$).

In 2009, Swedish emergency response protocols changed so that call handlers in emergency service dispatch centres instructed callers on how to perform CPR. A subgroup analysis of data from 2009 to 2011 showed that 35% of people who underwent CPR before the arrival of emergency medical services had resuscitation performed by a bystander receiving telephone instruction. The 30-day survival rate among these people was 10.9%, compared with 15.4% among people who received CPR from a bystander who was not being instructed by telephone.

Strengths of this study include the use of a large national sample. Limitations include that time to the start of CPR was estimated and some information in the registry was retrospectively reported.

Commentary by Professor Gavin Perkins, NIHR Senior Investigator, University of Warwick and Heart of England NHS Foundation Trust:

“The ‘chain of survival’ is a sequence of steps designed to optimise outcomes from out-of-hospital cardiac arrest ([Perkins et al. 2015](#)). The chain consists of 4 links – early recognition and early access; early CPR; early defibrillation; and effective post resuscitation care.

“This study reinforces the critical importance that CPR plays in the chain of survival. The study confirms that the sooner CPR is started, the greater the chance of survival (survival rate 15.6% if CPR was started within 3 minutes, falling to 0.9% if delayed by 15 minutes or more). Bystander CPR also increased the chances that the patient was in a shockable rhythm when the emergency services arrived (41.3% versus 30.7% in people who did not have CPR), and therefore potentially treatable by defibrillation.

“The study also shines a light on the critical importance of training the community in lifesaving CPR skills. Throughout the study period, the number of people trained to deliver CPR grew in parallel with the proportion of cases where bystander CPR was initiated before the ambulance arrived.

“Survival rates were higher if CPR was initiated spontaneously by a trained bystander rather than if the bystander relied on telephone instructions from the ambulance dispatcher. The shorter time to calling the emergency services for people who received bystander CPR could also potentially be explained by CPR training, which teaches people how to recognise cardiac arrest quickly.

“Bystander CPR rates are lower in the UK than in many other modern healthcare settings. The

Resuscitation Council (UK) recommends that all school children should be taught CPR and how to use an AED, and that everyone who is able to should learn CPR. Initiatives such as the [Call Push Rescue Campaign](#) by the British Heart Foundation and online learning tools like the Resuscitation Council (UK) [Lifesaver app](#) hope to go some way to addressing the shortfall in trained bystanders, but more work is needed. Improved survival rates linked to increased CPR training in several communities suggest substantial opportunities to save more lives each year if a systematic, national approach to CPR training is adopted ([Hansen et al. 2015](#)).

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