

## **Advanced Cardiac Life Support in Out-of-Hospital Cardiac Arrest**

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**Background:** Sudden cardiac arrest occurring outside the hospital is an important public health problem. The American Heart Association's four-step "chain of survival" concept has been promoted as a means of optimizing community responses to such emergencies. Better survival has been associated with the first three links in the chain: early access to emergency medical care, early CPR, and early defibrillation. Early advanced care (advanced cardiac life support), the fourth link, is often considered of benefit in that it provides advanced airway management and intravenous drug therapy. However, the incremental benefit of advanced life support has not been established for out-of-hospital cardiac arrest.

**Purpose:** To assess the incremental benefit with respect to survival and morbidity that results from the implementation of full pre-hospital advanced-life-support programs in the context of an existing emergency-medical-services system of rapid defibrillation.

**Outcomes:** The primary outcome measure was survival to hospital discharge, defined as the patient's leaving the hospital alive. Secondary survival measures included the return of spontaneous circulation and admission to the hospital. Cerebral performance score was also evaluated at hospital discharge.

**Methods:** 11 base hospitals providing care to 17 urban communities participated in a before and after controlled trial. All patients aged 16 years and older with an out-of-hospital cardiac arrest requiring resuscitation were included. There was a 12 month rapid defibrillation phase followed by a 36 month advanced life support phase (rapid defibrillation plus endotracheal intubation, intravenous line insertion, and administration of intravenous medications). Data were pooled across communities and the data-collection phases within each community were separated by intervening and overlapping run-in periods to allow for training and system optimization.

**Results:** 1391 patients were enrolled in the early defibrillation phase and 4247 patients were enrolled in the advanced life support phase. The rate of survival to hospital discharge did not improve significantly from the early defibrillation phase to the advanced life support phase. There were, however, improvements in the secondary outcomes, which were the rates of a return of spontaneous circulation (12.9 percent to 18.0 percent,  $P < 0.001$ ) and admission to the hospital (10.9 percent to 14.6 percent,  $P < 0.001$ ). There was no difference in cerebral performance score.

**Bottom Line:** The results of this study did not show any incremental benefit of introducing a full advanced-life-support program to an emergency-medical-services system of optimized rapid defibrillation. Further analysis did show that cardiac arrest witnessed by a bystander (early access), early bystander CPR and defibrillation within 8 minutes were each strongly associated with improved survival.