

Volunteers trained in CPR and the use of automated external defibrillators increased survival after out-of-hospital cardiac arrest

Hallstrom AP, Ornato JP, Weisfeldt M, et al. **Public-access defibrillation and survival after out-of-hospital cardiac arrest.** *N Engl J Med.* 2004;351:637-46.

QUESTION

Do more patients with out-of-hospital cardiac arrest survive to hospital discharge when response teams composed of volunteers trained in cardiopulmonary resuscitation (CPR) also use automated external defibrillators (AEDs)?

METHODS

Design: Cluster randomized controlled trial (Public Access Defibrillation [PAD] Trial).

Allocation: {Not concealed}†.*

Blinding: Blinded (data collectors and outcome assessors).*

Follow-up period: To hospital discharge. Community units were involved for a mean 22 months.

Setting: 993 community units in 24 North American regions.

Patients: Patients were persons ≥ 8 years of age with out-of-hospital cardiac arrest. 993 community facilities (e.g., shopping malls, recreation centers, hotels, and apartment complexes) were eligible for randomization as a community unit, either individually or as a group if they had a pool of volunteer responders able to deliver an AED within 3 minutes to a person having cardiac arrest and could

expect ≥ 1 out-of-hospital cardiac arrest during the study period. Facilities with on-site personnel with a duty to respond or those with existing AED programs were excluded.

Intervention: Community units were stratified for center and location (residential or public) and allocated to a CPR-plus-AED response system ($n = 496$ units [77 residential, 419 public]) or a CPR-only response system ($n = 497$ units [80 residential, 417 public]). Volunteer responders were trained according to American Heart Association guidelines with scheduled retraining.

Outcomes: Number of patients with definite out-of-hospital cardiac arrest surviving to hospital discharge. Secondary outcome was number of patients with definite or uncertain out-of-hospital cardiac arrest surviving to hospital discharge.

Patient follow-up: All discovered cardiac arrests were included (intention-to-treat analysis).

MAIN RESULTS

235 cardiac arrests were classified as definite, and 4 were classified as probable or uncertain. The number of definite out-of-hospital cardiac arrests was 128 in the CPR-plus-

AED group and 107 in the CPR-only group ($P = 0.09$). More patients in the CPR-plus-AED group survived to hospital discharge than did patients in the CPR-only group (30 vs 15, relative risk 2.0, 95% CI 1.07 to 3.77, $P = 0.03$). All but 2 of the survivors (1 in each group) were in public units.

CONCLUSION

In patients with out-of-hospital cardiac arrest, more patients survived to hospital discharge when response teams composed of volunteers trained in cardiopulmonary resuscitation (CPR) also used automated external defibrillators.

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*See Glossary.

†Information provided by author.

COMMENTARY

The survival rate of out-of-hospital cardiac arrest is less than 5% in most communities (1). Improved survival with early defibrillation was first reported 20 years ago and has since been confirmed with the Ontario Prehospital Advanced Life Support (OPALS) study (2, 3).

The North America-wide cluster trial by the PAD Trial Investigators assessed the effect on survival after out-of-hospital cardiac arrest of early defibrillation via PAD. Cluster trials are studies in which the unit of randomization is a group rather than an individual and are typically more complex in design and analysis than randomized controlled trials (4). As the methodological details show, this cluster trial is no exception and the authors are to be congratulated for its successful completion (5). The "CONSORT Statement: Extension to Cluster Randomized Trials" was created to accommodate the reporting of the special features of the cluster randomized trial (4). The PAD trial has largely complied with the checklist of 22 items, including 14 additions to the 2001 CONSORT guidelines. However, there is no reported intracluster correlation—the measure of dependence between individual observations and the cluster to which they belong for each outcome (4, 6). This adds to the difficulty in interpreting the precision of the study's results.

Although this study reports that PAD can improve survival after out-of-hospital cardiac arrest, it affects < 10% of these patients. Given the

costs involved with PAD, it should be considered only after more cost-effective measures, such as CPR training of citizens and reduced emergency medical service response times, have been implemented (1, 3).

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