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CLINICAL PAPER

A national scheme for public access defibrillation in England and Wales: Early results☆

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Summary
Background: Automated external defibrillators (AEDs) operated by lay persons are used in the UK in a National Defibrillator Programme promoting public access defibrillation (PAD).
Methods: Two strategies are used:(1) Static AEDs installed permanently in busy public places operated by those working nearby. (2) Mobile AEDs operated by community first responders (CFRs) who travel to the casualty.
Results: One thousand five hundred and thirty resuscitation attempts. With static AEDs, return of spontaneous circulation (ROSC) was achieved in 170/437 (39%) patients, hospital discharge in 113/437 (26%). With mobile AEDs, ROSC was achieved in 110/1093 (10%), hospital discharge in 32 (2.9%) ($P < 0.001$ for both variables).More shocks were administered with static AEDS 347/437 (79%) than mobile AEDs 388/1093 (35.5%) $P < 0.001$. Highly significant advantages existed for witnessed arrests, administration of shocks, bystander CPR before arrival of AED and short delays to start CPR and attach AED. These factors were more common with static AEDs. For CFRs, patients at home did less well than those at other locations for ROSC ($P < 0.001$) and survival ($P = .006$). Patients at home were older, more arrests were unwitnessed, fewer shocks were given, delays to start CPR and attach electrodes were longer.

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Conclusions: PAD is a highly effective strategy for patients with sudden cardiac arrest due to ventricular fibrillation who arrest in public places where AEDs are installed. Community responders who travel with an AED are less effective, but offer some prospect of resuscitation for many patients who would otherwise receive no treatment. Both strategies merit continuing development.

Introduction

The use of automated external defibrillators (AEDs) by lay persons who are not professional health care providers, ('public access defibrillation', PAD) has proved an effective strategy in the management of sudden cardiac arrest occurring outside hospital.[1–10] Delays in performing defibrillation can be appreciably reduced if those nearby can use an AED before the arrival of the emergency medical services.

Most reports of PAD have described the use of AEDs made available in public places where the possibility of cardiac arrests can be foreseen and where lay persons working in the vicinity can be trained to use them.[1–5,7,10] This is sometimes termed the 'static AED' or 'on-site' strategy.[10,11] The alternative 'mobile' strategy for PAD employs lay volunteers as 'community first responders' (CFRs) dispatched by ambulance control centres because they can reach a victim sooner than a conventional ambulance. In some areas of the United Kingdom (UK) members of the fire and police services also act in this role. Such community first responders are not limited to specific sites. They may provide the best option for treating patients at home, the commonest place for cardiac arrest to occur.[12–14]

In England and Wales, PAD developed during the 1990s principally through the provision of AEDs driven by the British Heart Foundation (BHF), the UK's leading heart charity. This was to equip not only locations where the 'on-site' strategy was planned but also community first responders (FRs) for the mobile strategy planned in association with ambulance services. Later, the Government, through the Department of Health (DH), made PAD a core part of the National Health Service (NHS) in England by placing 700 AEDs at high risk locations.[15] These complemented AEDs already installed at other public sites or used by community first responder schemes.

Subsequently, the BHF was awarded a national lottery grant and joined forces with the Department of Health to coordinate the expansion of both PAD strategies throughout England through a National Defibrillator Programme (NDP). The Welsh Assembly Government and the BHF later established similar arrangements in Wales.

This paper describes the largest series of resuscitation attempts reported to date within an evolving PAD programme and is based on nationwide statistics. We report the effectiveness of defibrillation by lay persons and the relative effectiveness of different PAD strategies used in the UK.

Methods

The establishment of the National Defibrillator Programme, methods of data collection and standard report form used are described in detail elsewhere.[16,17] The cost of AEDs, related equipment, training and administration was provided by the NHS, the BHF, and a national lottery fund.

(a) 'On-site' defibrillators

The DH placed AEDs in busy public places identified from routine ambulance data as sites where cardiac arrest was liable to occur such as airports and major railway stations. AEDs are kept in unlocked protective cabinets within 200 m walking distance from any part of the premises to which the public has access. Staff working at these sites volunteered to be trained over 4 h to provide basic life support (BLS) and to use an AED. A standardized competency-based curriculum with adequate manikin practice is supplemented by simulated cardiac arrest scenarios. Most training is provided by the statutory ambulance services. Similar arrangements were adopted by other organizations in sports facilities, workplaces, shopping centres and exhibition halls; these AEDs were usually funded by the BHF. At major sporting venues, members of the voluntary societies such as St John Ambulance and the Red Cross attend during events with one or more AEDs.

(b) ''Mobile' defibrillators with community first responders

Ambulance services train and equip lay community first responders to provide a service in the areas they administer. Dispatch is by ambulance control centres in response to emergency calls from the public. This strategy is commonly used in rural areas where ambulance response times are necessarily long. Police and fire services coordinate their own training, usually in conjunction with the local ambulance service. Deployment is by ambulance control centres or the control centre for the organization concerned.

Data collection and statistical analysis

Data are recorded at the location on a report form compatible with the Utstein system for uniform recording of prehospital resuscitation attempts.[18] The intervals between collapse and both the institution of basic life support and attachment of AED pads are usually estimated, but are sometimes supported by data from ambulance or other control systems. The interval from collapse to placement of pads allows a comparison of time to treatment for patients with and without shockable rhythms.

Data from report forms were entered into a Microsoft Access database, and subsequently into SPSS v 12.0.2 for statistical analysis. Comparisons were made between groups A and B and between groups B and C as defined below, using chi-square tests for binary variables such as sex or survival, and Mann—Whitney tests for continuous variables