Use of AEDs by Lay People in Patients with Out-of-Hospital Cardiac Arrest: How Does It Impact Survival?

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Sudden cardiac arrest (SCA) claims an estimated 50,000 lives per year in Italy, representing a major public health problem. More people die each day of potentially reversible ventricular fibrillation (VF) than of any other cause of death, reversible or not. We know that restoring normal heart rhythm by a defibrillation shock not only saves life but is often followed by many years of active living. Unfortunately, most cardiac arrest does not occur in supervised places, and in more typical community settings victims of SCA rarely survive. Only 2%-5% of victims of SCA can be resuscitated with the commonly used emergency system of ambulances. The problem could be resolved simply by making defibrillation available to lay persons [1].

Defibrillation

Although (semi)automatic external defibrillators (AEDs) have been available in the United States for a long time [2], they have only recently been introduced in Europe. AEDs have become a suitable device for use by policemen and laymen. Placing AEDs in public places and training lay people in their use has given new hope in fighting sudden death and resulted in improved survival in cardiac resuscitation [3-8].

Preliminary experiences have suggested that a two-tier system involving a “first responder” with an AED who can arrive within 4–5 min may improve survival in comparison with a single-tier system that aims to deliver a fully trained paramedic in 8 min [9]. Seattle has achieved an average response time of 7 min and a VF survival rate of 30% [10]. In Rochester, Minnesota, response time averages 6 min and 45% survive [11].

When resuscitation in the community relies predominantly upon the ambulance service, every effort to improve survival rates seems to be useless.
Recently the data from the United Kingdom experience in training the ambulance crews better were published. The chances of a patient surviving SCA to be discharged from hospital alive did not appear to be affected by the paramedics' length of experience. The growing number of trained paramedics do not seem to improve the survival rate (14% in 1987–1989; 11.4% in 1992–1993) in either Scotland [12] or England [13].

Laypersons are the most likely to arrive first at the scene of an arrest.

**Public Access Defibrillation**

Public access defibrillation is the concept of placing AEDs in public and/or private settings where large numbers of people congregate or where people generally considered at high risk for heart attacks live or are found. All emergency first responder's vehicles and ambulances should be equipped with an AED. The American Heart Association has a goal of helping business and other facilities to establish public access defibrillation programs in order to reduce the time to defibrillation.

Therefore, most AEDs are designed to be used by nonmedical personnel such as police, fire service personnel, flight attendants, security guards, and other lay rescuers who have been properly trained. To fight SCA successfully, the goal should be to train many people in early defibrillation, and to provide them with AED which they can apply while awaiting for the medical emergency services to arrive. Early defibrillation gives the heart an opportunity to resume beating effectively. Of course, an AED only treats a fibrillating heart. In cardiac arrest without VF the heart does not respond to electrical current, but needs medication and breathing support instead. Also, AEDs are less successful when the victim has been in cardiac arrest for longer than a few minutes.

**International Experience of Public Access Defibrillation**

During the last 20 years, the experiences of several emergency departments in North American communities have been published and have demonstrated an increased discharge survival rate after out-of-hospital SCA treated by early defibrillation by police and paramedics: Table 1 summarizes the beneficial effects of this intervention. The lowest survival rates occurred in single-response systems and the highest rates in double-response systems, although there was considerable variation within each type of system. Hypothetical survival curves suggest that the ability to resuscitate is a function of the time, type, and sequence of therapy. Survival appears to be highest in double-response systems because ED is started early: the institutional emergency medical system is supported and coordinates the activation of organizations formed by lay volunteers equipped with an AED, who can provide first rescue and early defibrillation within 4–5 min. The development of this two-tier sys-