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Citation: Nishi, T., et al. Improper bystander-performed basic life support in cardiac arrests managed with public automated external defibrillators. *American Journal of Emergency Medicine*. 33 (2015) 43-49.

Clinical Question: To assess the quality of BLS in out-of-hospital cardiac arrests in patients who receive bystander CPR with and without the use of AEDs.

Introduction: Automated external defibrillators (AEDs) have been designed to be easy to use so that even providers with minimal to no training can use them appropriately. It has, however, been theorized that the use of AEDs can lead to detrimental outcomes secondary to delayed time to initiation of CPR (who preferentially will place AED before beginning chest compressions), delay in placement of emergency call, and unnecessary breaks in performing CPR due to AED rhythm checks. The number of public AEDs has increased but the quality of BLS with use of AEDs has not been studied. The goal of this study was to compare BLS responses in out of hospital cardiac arrest (OHCA) with and without use of public AEDs. The study also compared breaks in CPR between health care providers and non-health care providers.

Methods: This was a prospective study performed in Japan from 2006 to 2012. The population in question has approximately a 3% rate of BLS certification. The current practice is telephone assisted CPR where dispatchers instruct callers in the method of compression-only CPR unless they are health care providers or trained in BLS. During the study period, data was prospectively collected from OHCA that were not witnessed by EMTs. In cases where AEDs were applied, the fire department collected ECG and AED application records when available. Information collected included initial cardiac rhythm, shocks delivered, time between collapse and initiation of CPR, time until EMT arrival, pauses in chest compressions, length of the pauses, and rate of CPR. Outcomes measured included sustained ROSC (>20 min), one year survival, and one year neurologically favorable survival (CPC of 1 or 2).

Results: A total of 6,407 OHCA were witnessed during the study period and in 273 cases an AED was applied (4.3% of cases). Bystander CPR was performed in 249 (91.2%) of cases where AEDs were used and in 3,491 (56.9%) of cases where an AED was not applied. Of the 249 cases where AEDs were applied 216 had no defibrillation prior to EMT arrival. AED/ECG records were only obtained in 55% of these cases. ROSC prior to EMT arrival was 0.4% in the non-AED group and 2.8% in the AED group (although only increased neurologically favorable outcomes in the shockable rhythm group). When AEDs were applied, health care providers were responsible in 82.7% of cases. Intervals between emergency call and bystander CPR were significantly shorter in the AED application group. HCPs were more likely to power on the AED prior to the emergency call. CPR was of higher quality in the HCP group.

Discussion: Essentially this case confirms what we all assumed would be true. Out of hospital cardiac arrest is bad and no matter what happens your odds of a poor outcome are very high. However, if you are going to go into cardiac arrest I suggest that you do it around someone who is trained in at least BLS and preferably with an AED nearby. Your odds of making it to the hospital alive are better and if you have a shockable rhythm your odds of a favorable neurological outcome are better (but still poor). This obviously isn't a perfect study and it makes some generalizations but it shows that people who know CPR are more likely to perform CPR and it shows that use of AEDs, quality CPR, and a quicker time from arrest to arrival at the hospital give the best chance at survival.

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