Public Access Defibrillation Programs: Improving Outcomes Worldwide

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Out of hospital cardiac arrest (OHCA) is one of the most frequent causes of death and leading cause of healthcare expenditures.¹ This has led to significant research to study ways to reduce morbidity and mortality secondary to OHCA. The American Heart Association has developed a campaign to improve awareness and outcomes of patients suffering an OHCA. A prominent part of this campaign is the development of the chain of survival. The chain of survival includes 5 links: (1) Immediate recognition of cardiac arrest and activation of the emergency response system, (2) Early cardiopulmonary resuscitation (CPR) with an emphasis on chest compressions, (3) Rapid defibrillation, (4) Effective advanced life support, and (5) Integrated post-cardiac arrest care (http://cpr.heart.org/AHAECC/CPRAndECC/AboutCPR-FirstAid/CPRFactsAndStats/UCM_475731_CPR-Chain-of-Survival.jsp).

For patients with an OHCA secondary to a ventricular arrhythmia, rapid defibrillation is a key factor to improved survival with minimal neurological impact. Studies show that rapid defibrillation within 5 minutes of a cardiac arrest secondary to ventricular fibrillation is needed to ensure a good outcome.² A prospective randomized study showed that public access defibrillation (PAD) could increase the number of survivors with OHCA in public locations.¹ In order to provide rapid access to defibrillation, PAD programs have been established to provide access to defibrillators in high-use public areas. Studies show that PAD programs in railways, casinos, and airports in the United States, Europe, and Japan have improved survival in patients with OHCA.³⁻⁷ Despite this, a study showed that PAD was deployed successfully in less than 2% of OHCA, suggesting that there are still areas that can improve their access and deployment of PAD.⁸ All of the studies of PAD programs have been in the United States, Europe, and Japan. No targeted PAD program had been studied in Latin America.

In this issue of the Journal of the American Heart Association (JAHA), Gianotto-Oliveira et al look at survival after ventricular fibrillation cardiac arrest in the Sao Paulo Metropolitan Subway System following the implementation of a targeted PAD program.⁹ Their 2006 study was the first of a targeted PAD program in Latin America. The program placed automated external defibrillators in railway stations and provided Heartsaver First Aid cardiopulmonary resuscitation (CPR) automated external defibrillator training and refresher courses for security officers. The Sao Paulo railway system is an ideal location for a PAD program because the railway system carries approximately 4.5 million passengers per day. The systems-dedicated security officers and cameras allow for rapid recognition, CPR, and defibrillation.

During the study period, 62 subjects had a cardiac arrest with an initial rhythm of ventricular fibrillation. Of the 62 subjects, 23 (37%) survived to hospital discharge with minimal neurological impairment. Survivors were younger and had shorter times from cardiac arrest to CPR, to the arrival of an automated external defibrillator, to the first defibrillator shock, and to the arrival of emergency medical services personnel. On multivariable analysis, time interval from collapse and first shock was the only variable associated with improved survival with minimal neurological compromise. When comparing the initial year of implementation of the PAD program with the last 5 years of the study, once full implementation had occurred, survival increased.

Their study highlighted areas in need of improvement and showed that it is necessary to strengthen all parts of the chain of survival to achieve the ultimate goal. It was surprising to learn that during the 6-year study, no layperson performed CPR for any of the cardiac arrests. The first 2 links of the chain can be improved upon by increasing the number of laypersons who are willing and able to provide CPR when needed. We should seize the opportunity to continue to educate the public on the importance of CPR and identify...
barriers to providing CPR. With the development of compression-only CPR and removing the perceived barrier that some laypersons have in providing ventilation, there is the hope that this will improve the willingness of laypersons to perform CPR. It also shows that continued efforts are needed to raise public awareness of the need for layperson CPR. It is also an opportunity to develop programs that will increase the number of laypersons who are trained in CPR.

Another area for improvement raised by the study is that survivors had a shorter time from collapse to emergency medical services arrival compared to nonsurvivors. Average time for emergency medical services arrival in San Paolo was higher than in prior reports. As shown in the study by Rea et al, patients with a ventricular fibrillation arrest restoration of spontaneous circulation improved from 33% to 84% after emergency medical services arrival. The authors postulate that improved emergency medical services care can improve the outcomes of the targeted PAD program, again stressing the importance of strengthening all links of the chain.

The third area of improvement identified by the study is postarrest care. Thirty-four patients were alive to hospital admission, but 23 were discharged from the hospital with minimal neurological impairment. There was no standardized postarrest care that was administered to patients (targeted temperature management, time to coronary angiography) which if provided would have improved the last chain of survival: “Integrated post-cardiac arrest care.”

The authors in this study are able to demonstrate that targeted PAD programs can be successful in a Latin American city with significant congestion and traffic concerns. Their data combined with prior studies show that targeted PAD programs can be successful throughout the world. Increased advocacy is needed establish more targeted PAD programs worldwide. Targeted PAD programs should not occur in isolation, but should include programs to improve all parts of the chain of survival, in particular, public awareness of cardiac arrest and the need for rapid CPR administration.

Disclosures
None.

References

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