Reducing Barriers for Implementation of Bystander-Initiated Cardiopulmonary Resuscitation

A Scientific Statement From the American Heart Association for Healthcare Providers, Policymakers, and Community Leaders Regarding the Effectiveness of Cardiopulmonary Resuscitation

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Sudden cardiac arrest (SCA) is a leading cause of death in the United States and Canada. In the United States, each year ≈330,000 people die of coronary heart disease out of the hospital or in emergency departments. Of these, >150,000 SCAs occur out of the hospital.1,2 Despite the development of electrical defibrillation and the more recent implementation of lay rescuer defibrillation programs, the vast majority of these victims do not leave the hospital alive. In studies over the past 15 years, only 1.4% of patients with out-of-hospital arrest in Los Angeles, Calif, survived to hospital discharge3; in Chicago, Ill, the number was 2%,4 and in Detroit, Mich, it was <1%.5 Conversely, a few municipalities such as Seattle, Wash, report much higher survival rates from SCA—more than 15% in 1 study6—which suggests that survival rates need not remain so low. Recent work in Europe and elsewhere has confirmed that a higher survival-to-hospital discharge rate is indeed a realistic goal, with survival rates as high as 9% reported in Amsterdam7 and 21% in Maribor, Slovenia.8

The American Heart Association (AHA) uses 4 links in the “chain of survival” to illustrate the time-sensitive actions required for victims of SCA: (1) early recognition of the emergency and activation of emergency medical services (EMS), (2) early bystander cardiopulmonary resuscitation (CPR), (3) early delivery of shock(s) from a defibrillator if indicated, and (4) early advanced life support and postresuscitation care. Immediate bystander recognition of the emergency and EMS activation are critical. In many communities, however, these actions may be followed by significant delays, because the time interval from activation of EMS to arrival of these medical personnel may be 7 to 8 minutes or longer.4 Therefore, initial care in the first critical minutes after SCA, including performance of CPR and potential use of an automated external defibrillator (AED), depends on the actions of people near the victim. Although the majority of cardiac arrests occur in the home, the presence of trained and willing rescuers and the availability of an AED are critical whether the cardiac arrest occurs in a public space or at home.

Every 5 years, the AHA Emergency Cardiovascular Care (ECC) Committee publishes revised guidelines for resuscitation care.9 The “2005 American Heart Association Guidelines for CPR and ECC” emphasize 3 important concepts:

1. High-quality CPR is an important determinant of survival from SCA.
2. More victims of out-of-hospital SCA should receive bystander CPR.
3. CPR must be performed effectively by bystanders and healthcare providers.

CPR is an inexpensive and readily available technique that can save lives. Therefore, the number of people trained in CPR must increase, and the quality of CPR provided by every rescuer must improve.

Background: Bystander CPR Can Save Lives

Cardiac arrest is defined as the sudden cessation of functional cardiac mechanical activity, as confirmed by the absence of...
signs of circulation, including absence of response to stimulation, absence of breathing, and absence of a detectable pulse. SCA is often precipitated by a sudden arrhythmia, ventricular fibrillation, which causes the heart to quiver so that it cannot generate blood flow. The treatment of ventricular fibrillation requires chest compressions and delivery of shocks with a defibrillator. Chest compressions during CPR can generate a small but critical amount of blood flow to vital organs such as the brain and heart until circulation is restored by defibrillation or other therapy.

A number of reports have illustrated that bystander CPR can substantially improve rates of survival from SCA.10–14 A bystander is a person who happens to be near the victim and who is not part of the organized emergency response system. In most events, the bystanders do not have professional healthcare education. Earlier initiation of CPR improves survival rates, and when bystanders perform CPR well, the victim’s chance of survival improves. In several studies, high-quality CPR was associated with a marked improvement in survival to hospital discharge.10–12 Furthermore, recent evidence suggests that CPR may be particularly important in cases of prolonged cardiac arrest (ie, an arrest duration of >4 to 5 minutes without treatment).15,16

CPR is a highly accessible therapy that requires little medical training and no equipment when provided in its most basic form. Potential rescuers from school age to the elderly can learn CPR skills. In places where widespread first-responder CPR training has been provided (eg, as part of community lay rescuer AED programs), survival rates from witnessed SCA associated with ventricular fibrillation have been reported to be as high as 49% to 74%.17,18 Therefore, equipping the public with the skills to perform the first 3 links in the AHA chain of survival can make a dramatic difference in survival from SCA.

The Problem: Bystander CPR Rates Are Low

If bystander CPR can markedly improve outcomes, why are survival rates from out-of-hospital SCA still so poor? The low rate of bystander CPR performed is a significant contributor. Studies have documented that in many communities, only 15% to 30% of SCA victims receive bystander CPR before EMS personnel arrive at the scene.19,20 Low rates of bystander CPR have been documented even in settings where trained rescuers were present. Given that the time interval for EMS arrival is often 7 to 8 minutes or longer and that survival falls 7% to 10% for each minute without CPR,13 the lack of bystander CPR has a large impact on outcomes.

Some investigations have shown that even when CPR is performed by trained healthcare professionals, the quality of CPR delivered is often poor and often does not comply with AHA guidelines.21,22 These observational studies documented the fact that experienced providers delivered chest compressions that were too shallow, were interrupted frequently, and, in 1 report, were accompanied by an excessive rate of rescue breathing.

A number of theories have been proposed to explain why bystanders hesitate to perform CPR even when trained. Some surveys indicated a reluctance among some potential providers to perform mouth-to-mouth breathing, in part because of concern about transmission of infectious disease. However, a recent survey of bystanders who were present at actual arrest events does not support this concern.23 Another impediment to the learning and delivery of bystander CPR may be the complexity of resuscitation guidelines and instructional materials. Such complexity increases the likelihood that bystanders will fail to learn CPR skills, will fail to recall them, or may lack the confidence to perform CPR because they fear performing it incorrectly. This “fear of failure” is the most commonly cited concern in a recent survey of bystanders who witnessed an SCA event.23 In addition, some bystanders may decline to perform CPR because of fear of legal liability because they may not be aware of the “Good Samaritan” legislation that provides limited immunity for rescuers in the majority of states and municipalities.

Recommendations to Increase Rates of Bystander CPR

CPR is a potentially lifesaving intervention that can be implemented by the public without the need for expensive equipment or professional credentials. If the rate and quality of bystander CPR are increased substantially, the potential exists to save the lives of thousands of victims of SCA each year. A number of straightforward methods can achieve this goal.

Broaden CPR Training

To accelerate CPR education, creative new approaches are required to reach a larger public audience. The development and validation of a 22-minute self-instructional CPR course by the AHA (Family and Friends CPR Anytime) has provided a tool for education outside the classroom (Table).24 Community and corporate programs should be developed to encourage CPR
improve the quality of CPR delivered during any attempted resuscitation. These monitoring data should be used to maximize the quality of resuscitation care delivered, including the quality of CPR performance.

At present, a variety of devices have been developed to both measure and provide feedback on the performance of CPR in the form of either defibrillators with additional CPR monitoring capabilities or stand-alone devices that can be used by rescuers even before a defibrillator can be brought to the scene of an arrest. Some of these devices can also record CPR performance and provide opportunities for debriefing and training. Such tools may have an important impact on this quality-improvement goal in coming years.

Future Directions
Several newer training modalities may have a great impact on CPR training in the near future. The use of Internet–based CPR education and certification may augment the reach of current training programs, especially in light of the expanding access to the Internet via television, mobile telephone, and other personal devices. Under certain circumstances, simpler methods of bystander resuscitation, such as chest-compression-only CPR, may also encourage broader participation and remain an area of active scientific investigation. For EMS, hospital systems, and other professional CPR providers, the use of rigorous simulation with video recording and debriefing may serve as a staple in resuscitation training; the use of such patient simulators is a rapidly expanding area of current research.

Recommendations Summary
On the basis of the above discussion, the following recommendations can be made:

1. Government agencies at the local, state, and federal level should provide CPR education in such settings as school systems and government-funded hospital and clinic systems.
2. EMS and 9-1-1 systems should implement and support dispatch-assisted CPR programs.
3. CPR instructors, EMS leaders, and government agencies should strengthen public awareness of Good Samaritan laws and of the dramatic lifesaving potential of bystander CPR.
4. EMS systems and CPR instructors should focus efforts on rigorous CPR performance and quality-improvement ef-
forts in resuscitation care; when CPR certification is
needed, CPR instructional programs should always include
an objective CPR quality assessment for certification.
5. Research funds should be targeted toward improving
methods of CPR education, improving skill retention, and
developing creative methods to widen the scope of current
CPR training and education.

Conclusions
To maximize the chance of a successful resuscitation out-
come, CPR must be started as soon as possible after a victim
of SCA collapses. Improved survival rates depend on a public
trained and motivated to recognize the emergency, activate
EMS or the emergency response system, initiate high-quality
CPR, and use an AED if available.

Ample evidence has shown that CPR works. “Pushing hard and
pushing fast” maintains a small but critical amount of blood flow to
the brain and heart that can significantly improve the chance of
survival for victims of SCA. Performance of high-quality bystander
CPR can be increased through widespread dissemination of self-
instructional CPR courses, effective public education about the
low risks of performing CPR, continuous CPR quality-improvement
processes for lay and professional rescuer programs, and meaning-
ful legislative initiatives designed to support and encourage layper-
son action during an emergency. Through these actions, which are
intended to encourage and broaden CPR training, thousands of
additional lives can be saved every year.

Disclosures

Writing Group Disclosures

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<th>Writing Group Member</th>
<th>Employment</th>
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<th>Other Research Support</th>
<th>Ownership Interest</th>
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References


Key Words: AHA Scientific Statement ■ cardiopulmonary resuscitation ■ resuscitation ■ heart arrest ■ defibrillation
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*Circulation.* 2008;117:704-709; originally published online January 14, 2008; doi: 10.1161/CIRCULATIONAHA.107.188486
*Circulation* is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
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Print ISSN: 0009-7322. Online ISSN: 1524-4539

The online version of this article, along with updated information and services, is located on the World Wide Web at:
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