

community early defibrillation

*The vital role of community early defibrillation
in the Chain of Survival with related conference
proceedings from the EMS Today 2001 Conference*

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How to Launch a Community Early Defibrillation Program

3 advocates of community early defibrillation programs share their success stories at an EMS Today 2001 Luncheon sponsored by Philips/Heartstream

By Jane Jerrard

More than 60 emergency services professionals attended an EMS Today 2001 preconference symposium, "How to Champion Public Access Defibrillation in Your Community: Leadership, Art and Science," hosted by AED manufacturer Philips/Heartstream. Their goal: to learn the practicalities of starting and maintaining an early defibrillation program in their communities.

The recent increase in research and attention to community early defibrillation programs led Philips/Heartstream to host the symposium, which featured cardiac arrest survivor Diane Jackson, as well as three community early defibrillation program advocates who've implemented early defibrillation programs in their communities. Their advice for kick-starting early defibrillation programs in your community follows.

Survivor's Story

This cheesecake is going to kill me," joked 53-year-old Diane Jackson to her coworkers in the Universal Studios (Orlando) employee cafeteria on April 29, 2000. An instant later she keeled over in sudden cardiac arrest.



Diane Jackson

One of her coworkers—a former fire chief—began CPR while another called 9-1-1. Jon Kipp, manager of health services for Universal Studios heard the call over his radio. He rushed to the scene and used a nearby AED to resuscitate Jackson. When the fire department arrived (six minutes after dispatch), Jackson was awake and alert.

Programs into Action

Studies prove that hundreds of patients like Diane Jackson have benefited from early defibrillation programs, which is little surprise to those of us who work in emergency services. Consider this: The average survival rate of witnessed sudden cardiac arrest in the United States is 5%, but in areas that use early defibrillation programs the local survival rates jump as high as 20%.

Clearly, every community can benefit from implementing an early defibrillation program. By training first responders (police officers, security guards, flight attendants and laypeople) in CPR and AED use—and by placing AEDs in public areas—communities can cut response times drastically. However, because community early defibrillation programs are relatively new, we have many roadblocks to overcome: Who will champion the program and work with local businesses and municipal departments? What funding sources can be tapped? Who will maintain the equipment? Who will handle public education and training?

Get Government Buy-in

As a city councilman in Florida, Dave Freudenberg spearheaded

the development of Boca Raton's community early defibrillation program, enlisting the help of his EMS and fire departments once he got the city council to agree to the program. As he told attendees in his presentation, "The Leadership Factor: Enlisting the Political Power of Community Government," the most important step in getting community early defibrillation programs off the ground is obtaining local support. "Local government is where you need to start—preferably at the top," says Freudenberg, who insists this is the most rapid way to get local response.

"One of the problems I had in getting local support for a community early defibrillation program from our council was risk manage-



Local government is where you need to start—preferably at the top.

—Dave Freudenberg

ment," recalls Freudenberg. "The city's risk management department was concerned about lawsuits." In spite of a Good Samaritan law, designed to protect rescuers who make mistakes while attempting to help others, Boca Raton officials feared expensive litigation and bad public relations. Freudenberg countered by pushing the program through the city council, arguing that a city has to take certain risks. "It's the city council's job to set policies for the city," he points out. "They're the ones who will make the decision."

However, if initiating a community early defibrillation program seems too big to tackle by yourself, find a champion. "The first local politician who gets his hands on this information will own the program," says Freudenberg. "And politicians love a program to call their own. So figure it out: Who would be a leader on your council?"

Target your champion and approach them with a proposal. Once you have government buy-in, use your EMS department or find an individual to pull the pieces together.

Once all parties climb aboard, the difficult work begins: hammering out issues of responsibility and procedures for every aspect of the program. But, as Freudenberg told attendees, if you can rely on local government to act as a community early defibrillation advocate—whether it provides funding or the permission to locate AEDs in government buildings—your workload will be greatly reduced.

Freudenberg also used his involvement in Boca Raton's community early defibrillation program as part of his campaign platform to win a recent re-election campaign. Early defibrillation became not only his good work for the community, but the basis for his success as a city councilman. Other local politicians can leverage their work on these programs into professional success as well.

Take the Leading Role

Lead—don't follow, says Ed Racht, medical director, City of Austin/Travis County (Texas) EMS, who strongly believes that EMS agencies must take the driver's seat in promoting, developing and overseeing community early defibrillation programs. "Chances are, someone in your community is already looking at CED," he speculates. "You have to choose whether you want to drive that boat or whether you want to be a passenger. Either way, it's moving ahead."

"[Emergency services personnel] are the most knowledgeable about out-of-hospital resuscitation," Racht points out, "and we're the only common link in the Chain of Survival besides the patient." In addition, EMS can track resuscitation trends and evaluate current survival rates and response details for the community—features no other community partner can provide.

However, as Racht discussed in his presentation, "The Art of Integrating All the Community Players," EMS should not be the only participant in your CED program. Include *all* responding EMS organizations, law enforcement, the local medical community, local businesses, members of the local chapter of the American Heart Association and American Red Cross, community government and device manufacturers. You'll all face tough issues, including selling your community on the need for community early defibrillation and locating funds, while attempting to implement and maintain a program.

Racht recommends that every EMS system create a new position, such as a community early defibrillation captain or liaison,



EMS is the only common link in the Chain of Survival besides the patient. —Ed Racht, MD

who can co-develop a task force with all community participants. Finally, you'll need to divide responsibilities necessary to keep the program working. "How you structure your community will change the survival rate," says Racht.

Bottom line: EMS-driven community early defibrillation programs strengthen the entire Chain of Survival.

Manage Your Program

Steve Drenwiany oversees the Sunnyvale, Calif., community early defibrillation program, which includes AEDs in city buildings, on all police and fire apparatus and in the local mall. He has also assisted in developing several businesses' AED programs and training their personnel.

"The development of the supporting infrastructure of a community early defibrillation program is as critical to your success as the placement of the defibrillators," says Drenwiany. Many of Sunnyvale's early defibrillation resources go toward training. California requires rescuers to take a four-hour introductory course in AED use (and they must present a CPR card as a prerequisite

The infrastructure of a community early defibrillation program is as critical to your success as the placement of defibrillators. —Steve Drenwiany



to training), followed by quarterly skills checks. Other states' regulations vary from California's requirements.

Currently, Drenwiany—the EMS coordinator for the Department of Public Safety for Sunnyvale—is working to decentralize training in CPR and AED use. *Example:* He's trying to convince the city government to help with training citizens in CPR. He has requested that each city department select two of its employees who will each be responsible for holding two to four citizen classes a year. These trainers would also be responsible for the quarterly skills checks.

In his presentation, "The Science of Management: Operating a Community Public Access Defibrillation Program Day to Day," Drenwiany revealed another challenge of managing a community early defibrillation program: equipment maintenance. Drenwiany must continually update the maintenance schedules for every defibrillator in his system. Because California requires monthly AED checks, Drenwiany created an e-mail notification system to alert each person responsible for an on-site defibrillator in the city's program. When the contact receives Drenwiany's e-mail, they perform a safety check of their respective unit (following manufacturer specifications to check the defibrillator's operational readiness). When finished, each contact responds to Drenwiany's e-mail alert with an update on their AED's status.

Drenwiany emphasizes the importance of keeping data collection and record retention centralized. "I use an Access database to track all the training records, so we can see when skills checks or retraining requirements are due," he says. Sunnyvale's system also includes information on general records retention, criteria for records release (e.g., what you should do if police request AED information), physician reviews and an inventory of AED locations. "If someone calls up and asks, 'Where's defib #9887?' I can tell them," says Drenwiany. He also downloads all data from individual defibrillator data cards onto his computer, so all the data for city AEDs remains centralized as well.

Looking Ahead

As the EMS community joins with local governments, community service organizations and local businesses to shorten response times in their communities, more lives will be saved. "I'm grateful to our company for having a defibrillator on site," says survivor Diane Jackson, "and I'm going to work hard to make sure that companies all over our community get them."

Freudenberg, Racht and Drenwiany represent community early defibrillation program advocates at the forefront of a movement sure to touch every EMS system in America "This project means so much to me," says Freudenberg. "I think we can change lives all across the country if we join together."

Get the Data

**Research is underway to determine the benefits of community early defibrillation—
from the EMS Today 2001 presentation “Public Access Defibrillation: The Devil Is in the Details”**

By Roger D. White, MD, FACC

Numerous studies affirm the benefit of rapid defibrillation with AEDs. Most of the data have been acquired in emergency medical response systems with EMTs or firefighters providing defibrillation. Yet interest is growing in the provision of rapid defibrillation by other responders, including security officers, flight attendants and laypersons trained as targeted responders. This expansion is embraced in community early defibrillation.

A multicenter, prospective, randomized, controlled trial was recently launched to define the benefit of community early defibrillation. Data from this trial will likely identify the most effective deployment of AEDs, frequency and appropriateness of use, time of defibrillation before EMS arrival, device maintenance issues and—most importantly—survival benefit when compared with control groups without AEDs.

AEDs within Existing Response Systems

In addition to placing AEDs on ambulances, other approaches should be maximized to fully saturate current response systems. However, placement of additional AEDs within EMS systems remains pointless without assurance that the time to defibrillation will be compatible with improved survival. Most fire vehicles should carry AEDs, but it's not certain this will improve survival.¹

Another alternative is equipping police with defibrillators. Rochester, Minn., added police defibrillation to its EMS system and reported high discharge survival rates from ventricular fibrillation (VF) (see Figure 1).²⁻⁴ These survival rates reflect the rapidity with which defibrillation is accomplished; they don't depend on who delivers the shock (see Figure 2).

Community Early Defibrillation Recommendations

The 2000 *Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care*⁵ define three levels of community early defibrillation rescuers: Level 1 includes police, firefighters, security personnel, lifeguards and flight attendants who respond to emergency events; Level 2 comprises targeted responders, such as laypersons at work sites; and Level 3 includes family members of people at high risk for a cardiac arrest.

The *Guidelines* indicate that while we await data from the community early defibrillation trial, three considerations should be included in any institution of such a program: 1) there should be a reasonable probability of AED use (one cardiac arrest per 1,000 persons per year); 2) EMS call-to-shock time interval will likely be more than five minutes; and 3) placement of a community early defibrillation program can

reliably achieve a less-than-five-minute call-to-shock time interval in more than 90% of cases.

Current Data

The first data supporting institution of community early defibrillation programs focuses on defibrillation on aircraft and in terminals.⁶⁻⁸ American Airlines reports that among the first 15 patients in VF who received shocks, six (40%) survived to discharge. In a subsequent report, including 21 defibrillated patients, nine (43%) survived to discharge.⁸

Experience with using AEDs to treat cardiac arrest in casinos has shown encouraging outcomes.^{9,10} Security officers were instructed in CPR and AED operation, and AEDs were positioned to achieve a target collapse-to-defibrillation time interval of three minutes or less. Of 105 victims of VF cardiac arrest, 56 (53%) survived to discharge.¹⁰ Among the 90 patients whose VF arrest was witnessed, 53 (59%) were discharge survivors. In an updated report from the same investigators, now with 105 witnessed VF arrests, 56 (53%) survived to discharge. Because the time interval used in this setting was an accurate representation of the time of collapse to defibrillation, the more than three-minute time interval correlates closely with call-to-shock times and survival in Rochester (see Figure 2). In Figure 3, both data are plotted on the traditional survival curve, using call-to-shock times for witnessed VF arrest. These data indicate that similar overall survival from witnessed VF arrest can be achieved using a combined first responder/paramedic approach for provision of rapid defibrillation in a community setting.

Data Collection, Analysis & Reporting

While awaiting the results of the community early defibrillation trial, it's necessary that those with medical responsibility for community early defibrillation programs collect accurate data and report the outcomes. Data collection from all AEDs is available and procedures for collecting and analyzing these data have been described.^{3,4} No AED should be deployed without data collection capability, including call-to-shock times, on-scene return of spontaneous circulation (ROSC) with shocks only or ROSC after ALS interventions, admission to hospital and neurologically intact discharge survival. Documentation of time of arrival of EMS response will be mandatory in community early defibrillation programs. All programs should be under the direction of a physician with responsibility for data collection, analysis and reporting. Only in this manner will we understand the benefit and limitations of community early defibrillation programs.

Existing EMS system response to cardiac arrest should be max-

imized and community early defibrillation programs instituted if the proposed prerequisites are fulfilled and a commitment is made to collect, analyze and report accurate data. Otherwise, future community early defibrillation programs should await the results of the multicenter community early defibrillation trial to define the appropriate disposition of AEDs. It should not be assumed that placement of AEDs in a variety of settings will improve survival. Although every life saved provides compelling evidence of the benefit of rapid defibrillation, the objective of clinical investigators should be to acquire data that expand our understanding of the impact of AEDs in public locations. I hope science will drive the worldwide community early defibrillation initiative and also identify potential areas for expansion or for program alterations.

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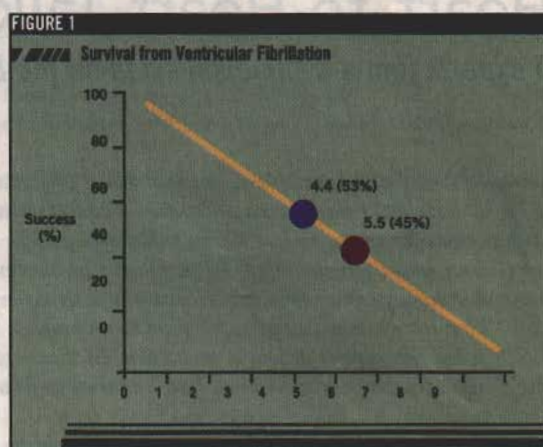


Figure 1: Patient outcomes in Rochester (Minn.) Early Defibrillation Program from November 1990 through December 1999. These data depict outcomes for all adult patients found in witnessed atrumatic ventricular fibrillation cardiac arrest.

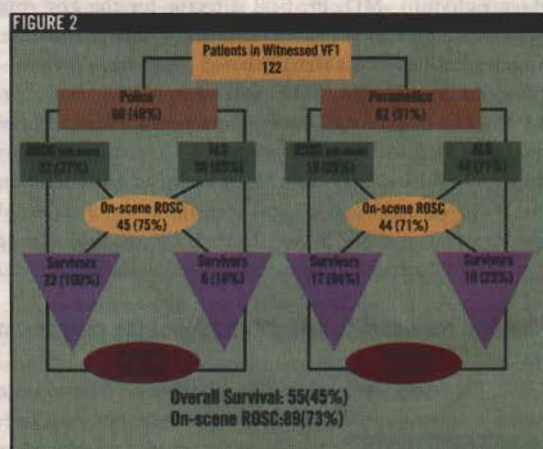


Figure 2: Call-to-shock times in Rochester (Minn.) Early Defibrillation Program for the patients shown in Figure 1.

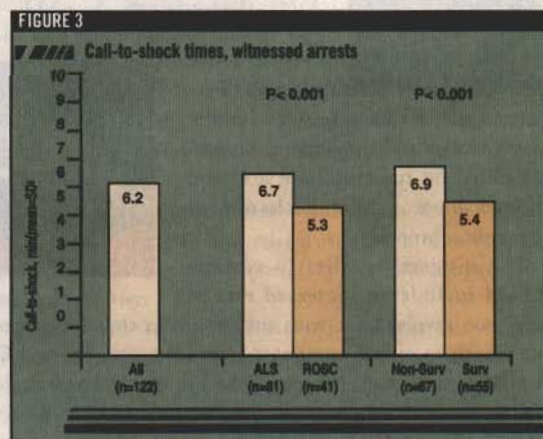


Figure 3: Traditional ventricular fibrillation survival curve. Call-to-shock time is on the vertical axis. The two data-points represent survival experience in casinos and in Rochester, Minn. See text for more details.

Online Resources

For free access to information tables, complete references and text of all the articles herein—and more community early defibrillation information and resources—

visit www.jems.com or www.chainofsurvival.com.

Heart-to-Heart Talk

5 experts join a frank discussion on the BLS aspects of the new CPR guidelines

This past August the American Heart Association (AHA) released a major revision of its recommendations for emergency cardiovascular care (ECC). The 2000 guidelines simplify CPR techniques for the layperson and strongly promote the use of community early defibrillation. What repercussions can we expect from these changes?

We asked five experts to join a roundtable discussion of the BLS aspects of these new guidelines. Their conversation follows.

Glenn Asaeda, MD, is the deputy medical director of the Fire Department of New York.

Richard O. Cummins, MD, professor of medicine, University of Washington, Division of Emergency Medicine, is the immediate past medical director of King County, Wash, Early Defibrillation Programs.

Marc Eckstein, MD, medical director for the Los Angeles City Fire Department, serves as medical director of the Los Angeles Public Access Defibrillation Program.

Edward M. Racht, MD, is the medical director for Austin/Travis County (Texas) Emergency Medical Services and Early Defibrillation Program.

Roger D. White, MD, FACC, professor of anesthesiology at the Mayo Medical School and consultant in anesthesiology (cardiovascular) at the Mayo Clinic, is the medical director of the City of Rochester (Minn.) Early Defibrillation Program.

What are the benefits and drawbacks of the changes in lay rescuer CPR?

Racht: *The benefits are twofold:* The guidelines are based on more available scientific evidence, and they're more practical, easier to teach and will be seen by lay rescuers as easier to master and retain. CPR courses will be less threatening to the lay community.

The major drawback is the perception by many in resuscitation education that the new guidelines "dummy down" CPR skills.

Asaeda: Most laypeople won't use their CPR skills before their certifications expire. By making steps simpler to remember and implement, laypeople called on to resuscitate a victim should have a better chance of responding properly.

The biggest benefits to victims should include an increased rate of layperson involvement with such items as the elimination of the mouth-to-mouth component from dispatch-assisted CPR, as well as a higher chance for the use of correct techniques during resuscitation.

Cummins: The most talked-about change has been the elimination of the pulse check by lay rescuers. Evidence proves that the human hand does a lousy job attempting to test for the pres-

ence of a pulse. The AHA considers one mistake—thinking the pulse is absent when it is really present—not such a big deal. The other error—thinking a pulse is present when it is really absent—is a big deal. You conclude by withholding CPR from someone who desperately needs it. Rescuers who have access to a defibrillator might prevent people in ventricular fibrillation (VF) from getting a chance to be defibrillated.

Eckstein: In addition to elimination of the pulse check, the other benefits to the changes are that the compression-ventilation ratios have been standardized to 15:2 for both one- and two-rescuer CPR with a patient who has an unprotected airway. Again, this simplification increases the likelihood that the lay rescuer will correctly perform BLS when indicated.

Finally, the emphasis on phoning first (i.e., calling 9-1-1) instead of first performing CPR for adults will help minimize the time to first shock.

What specific effects will these new layperson guidelines have on EMS personnel and first responders?

Eckstein: I think EMS personnel will encounter more cardiac arrest patients who have already had an AED applied. With the proliferation of community early defibrillation programs, it's important for every EMS agency to develop policies for the transition of care from a lay responder using an AED to BLS and ALS care. Familiarity with AEDs on the market and use of interface cables from the AEDs to the monitor/defibrillators you use will make this transition as seamless as possible.

Another effect is added medico-legal concerns for EMS personnel regarding AEDs. These issues should be covered in training, before EMS personnel encounter these scenarios in the field.



Asaeda: The committee's theory of phone-fast/phone-first should result in EMS and first responders being contacted sooner, bringing the links of early defibrillation and early advanced care closer to the time of collapse. With scientific research indicating a 7-10% decrease in survivability with each minute that passes, anything that brings earlier defibrillation and EMS access to the patient is a welcome event.

Racht: As in previous guideline releases, cultural acceptance is a challenge. ("No way I'm teaching my students not to check a pulse!") There will be a transition period from old to new, which will create a potential collision of practice between lay rescuers and first responders. This challenge will disappear as more individuals become trained and accept the new guidelines.

With these new guidelines in place, what is now the biggest roadblock to implementing community early defibrillation programs?



Racht: There are three roadblocks to successful community early defibrillation program implementation: Knowledge, perception of liability and cost. In terms of knowledge, EMS, lay rescuers and the general public have begun to understand the importance of rapid defibrillation.



Unfortunately, the perception of liability is powerful. But as more community early defibrillation legislation passes and we have more experience with widespread community early defibrillation programs, the perception pendulum will swing the other way—"Are we at risk if we *don't* implement community early defibrillation programs?"

Finally, we hope that market economics, newer technology and innovative business strategies decrease the cost of automated defibrillators. In communities or businesses (or residences) that make a decision to implement early defibrillation programs, cost remains a significant challenge.

Eckstein: The biggest roadblocks all lead to finding funding sources. Not only do communities need money to purchase the devices, but to provide the required training. It's vital EMS medical directors gain political support for funding to implement community early defibrillation programs. Perhaps the best way to accomplish this is to educate the public and local politicians on the success of established community early defibrillation programs.

White: It's hard to envision community early defibrillation programs encountering roadblocks, given its explosive growth rate. The more relevant questions relate to the appropriateness of its implementation in a variety of settings. The intent of the current prospective, randomized community early defibrillation trial is to identify patient outcomes in settings in which AEDs are deployed by non-medical people, compared with control groups trained in rapid EMS access and CPR but without AEDs.

Asaeda: The only unfortunate findings of the committee are that AED use by Level 2 and Level 3 responders received an indeterminate recommendation due to a lack of research. Perhaps if more studies showing higher survival rates are conducted, the use of AEDs by laypeople may receive higher recommendations. Dr. T.D. Valenzuela of the University of Arizona, Tucson, demonstrated as high as a 49% survival to discharge rate in casino environments, for example.

Cummins: In my opinion, when we talk about full implementation of community early defibrillation programs, we mean that everyone in the United States who experiences a sudden, witnessed cardiac arrest can expect someone to attach a defibrillator to their chest within two to four minutes of collapse. I think the biggest roadblock to this full implementation of community early defibrillation programs will come when the public realizes that even when fully implemented, we will only reach 30% or so of the people



who experience a sudden cardiac arrest.

The other 70% will happen in locations where defibrillators remain unavailable: private homes. Until we solve the problem of in-home sudden death, community early defibrillation will appear to have little effect from a population-based perspective.

What training issues have arisen as your services/communities have trained lay rescuers using the new guidelines?

White: The new guidelines have confronted instructors with the need to prepare themselves for correct application of the changes and the physiologic and/or instructional rationale for the changes.

Eckstein: It's more difficult to retrain individuals on new guidelines when they have already learned the older ones. The other main issue is the emphasis on AEDs. All BLS training should at least expose students to AEDs so they're familiar with the devices and would be comfortable using them if available in a public venue. This requires the instructors to have some of the AEDs currently in use.

Cummins: I think we now realize that video-based CPR training that combines watching and practicing is an effective, efficient and inexpensive approach. Existing training networks are experiencing some start-up pains, but their lack of success appears to be the result of instructors not learning to use the new tools smoothly and effectively.

What's the next step in furthering the Chain of Survival?

Asaeda: Besides early access, early CPR, early defibrillation and early advanced care, I agree with the 2000 guidelines that early education or early preparation in the form of CPR education in schools would advance the Chain of Survival. As the committee suggested, if evidence from prospective, randomized clinical trials is obtained, the concept of CPR in schools would merit a Class I recommendation.

White: Our Canadian Heart and Stroke Foundation colleagues have added some links to our four-link Chain of Survival. They are healthy [lifestyle] choices and early recognition at the first part of the chain and early rehabilitation at the end of the chain. I believe the first two additional links are particularly applicable to the concept of a Chain of Survival.



Cummins: More strength in the early access link will come when the training of emergency medical dispatchers routinely includes not only dispatcher-assisted CPR, but also dispatcher-assisted defibrillation.

Community early defibrillation programs and home defibrillation need to consolidate. EMS must step up to the plate and insist on serving as the major coordinators of all of early defibrillation activities in a community, as well as all individual home defibrillation programs. After all, every person who has an arrest, receives citizen CPR and has attachment of an AED will become a new patient for the EMS system.