LAW ENFORCEMENT AGENCY DEFIBRILLATION (LEA-D):

PROCEEDINGS OF THE NATIONAL CENTER FOR EARLY DEFIBRILLATION POLICE AED ISSUES FORUM

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INTRODUCTION

Scope of the Problem

Each year in the United States, 250,000[1] to 450,000[2] people collapse in sudden cardiac arrest (SCA); two-thirds arrest outside the hospital.[1] This is more than the annual number of deaths due to automobile accidents, cancer, and HIV combined.[3] In fact, it is more than the number of people who would die suddenly if a fully-loaded 747 aircraft crashed every day for a full year.

An estimated 45–85% of out-of-hospital cardiac arrest victims present with the reversible cardiac arrest rhythm of ventricular fibrillation (VF).[4–7] The speed with which electrical rescue shocks are delivered to the hearts of these victims correlates directly with the likelihood of survival: the sooner the heart is shocked, the more likely the victim is to survive (Fig. 1). Moreover, the sooner the heart is shocked, the better the neurological outcome.[8–10]

The combination of early access to the emergency medical services (EMS) system, cardiopulmonary resuscitation (CPR), and rapid defibrillation is commonly referred to as "the chain of survival."[11,12] Despite scientific confirmation that this chain of survival provides the optimal treatment for sudden cardiac arrest, SCA survival rates in the United States remain dismal. On average, only 7% of SCA victims survive.[13] If defibrillation could be delivered more rapidly, however, survival rates could be much higher.

Indeed, animal research and human studies in supervised cardiac rehabilitation centers indicate that survival rates can be as high as 90% with immediate defibrillation.[14–17] Relatively high VF survival rates also have been documented in King County, Washington (34%),[18,19] in Rochester, Minnesota (45%),[20] and in a casino study in Clark County, Nevada, including Las Vegas (59%).[21] The American Heart Association estimates that if communities could

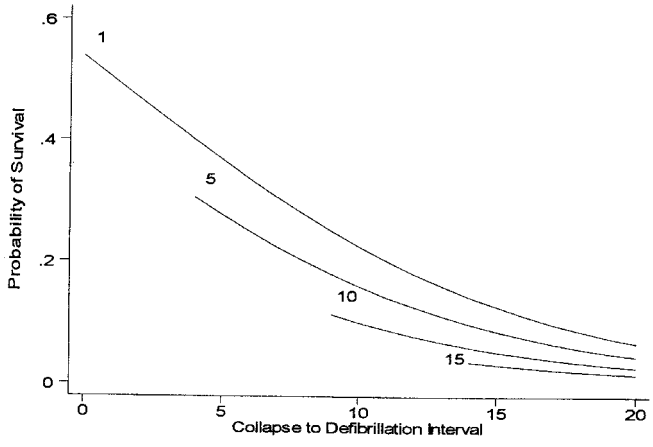

FIGURE 1. Probability of survival from ventricular fibrillation cardiac arrest based on intervals from collapse to cardiopulmonary resuscitation (CPR) and defibrillation. (Curves indicate time of initiation of CPR.) Reproduced with permission from: Valenzuela TD, Roe DJ, Cretin S, et al. Estimating effectiveness of cardiac arrest interventions: a logistic regression survival model. Circulation. 1997;96:3308-13.

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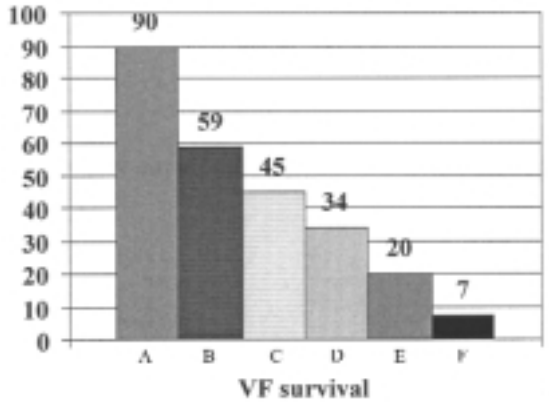

FIGURE 2. Actual and target ventricular fibrillation (VF) survival rates.[1,5,13,15–18,21] **A** = cardiac rehabilitation centers[15–17]; **B** = Casino Project[21]; **C** = Rochester, Minnesota[5]; **D** = King County, Washington[18]; **E** = target[1]; and **F** = U.S. average.[13]

achieve even a 20% survival rate, 50,000 lives could be saved each year[1] (Fig. 2).

Rationale for Law Enforcement Agency Defibrillation as a Solution

One of the strategies for rapid delivery of defibrillation in community settings that has been proposed is the use of automated external defibrillators (AEDs) by law enforcement agency (LEA) personnel. (We use the term "law enforcement agency" or "LEA" throughout this document to refer not only to police officers but also to other LEA personnel, such as sheriff department deputies, state troopers, correctional officers, treasury police, search and rescue personnel, and SWAT teams. However, for literary purposes, we sometimes use the terms "LEA" and "police" interchangeably.)

The rationale for LEA defibrillation (LEA-D) programs to supplement traditional EMS is based on the following principles:

- Typically, there are more LEA personnel than EMS personnel in a given community and they are continually on patrol throughout the service area, poised to respond immediately to emergencies. EMS units often are station-based, fewer in number, and subject to diversion from the service area to transport patients to the hospital or provide mutual aid. Thus, LEA personnel often arrive at the scene before EMS personnel.[20]
- LEA personnel have an established role as guardians of public safety. Moreover, most serve as guardians of public health: 81% of police departments respond to medical emergencies and 50% provide some level of patient care.[22] Adding defibrillation services should greatly enhance care rendered while not requiring significant operational changes.
- Sudden cardiac arrest occurs most often in the home (57%[23]–76%[24]), followed by public locations, such as medical clinics or other extended care facilities, work sites, streets and highways, airports, churches, and event centers.[25–29] LEA personnel often are in the vicinity of these locations.
- Advances in technology have made it possible for non-medical personnel to use AEDs quickly and safely with a minimum of training.[30] LEA personnel trained in the use of AEDs demonstrate skill competency levels comparable to those reported among EMS personnel.[31,32]
- There is a limited time during which defibrillation can be effective. Reducing the time from collapse to shock by even 1 or 2 minutes can determine whether or not the victim will survive.[5,20,33,34]

Therefore, it is reasoned, if LEA personnel can reach and treat victims with AEDs even a few minutes before EMS arrives, the chances for neurologically intact survival may improve.

This concept was endorsed in a joint position statement by the International Association of Chiefs of Police (IACP) and the International Association of Fire Chiefs (IAFC)[35] and further promulgated through publication of the IACP "Training Key" entitled *Automated External Defibrillators*, which outlines reasons "why police officers should have AEDs."[36]

Despite these developments, few law enforcement agencies provide defibrillation services. A national survey of state EMS departments determined that less than 20% of fire and police first-responder agencies (fire and police) were in a state of defibrillation readiness.[37] A national survey of law enforcement agencies found that AEDs were used by less than 3% of police agencies.[22]

NCED Police AED Issues Forum

To explore the concept of LEA-D as a strategy for improving survival from out-of-hospital cardiac arrest and to formulate a position statement on the issue, the National Center for Early Defibrillation (NCED)[38] convened cardiac arrest researchers and law enforcement agency leaders in January 2001 at the NCED Police AED Issues Forum (Fig. 3).

The goals of the NCED Police AED Issues Forum were to: 1) share results and experiences from research studies and model police AED programs; 2) identify barriers to police AED use; 3) make recommendations on ways to overcome these barriers; and 4) improve the frequency and effectiveness of AED use among police first responders. Efforts were made to examine not only scientific research but also the practical experience of police providers and administrators.

An overview of the problem of sudden cardiac

arrest, including published research on early defibrillation and the use of automated external defibrillators (AEDs) by first responders, particularly law enforcement personnel, was presented. This was followed by a panel discussion that addressed ten key issues: identification of law enforcement agencies that should provide AED services; integration of police-AED programs within the public safety system; dispatch; medical oversight; training; liability; personnel; program coordination; equipment; and quality.

Panelists drew from science and practical experience to examine each issue. Observers were given the opportunity to comment. Recommendations from the panel formed the basis for an NCED LEA-D position statement and best practices recommendations.[39]

Research Review

LEA-D Studies

Rochester, Minnesota

The concept of the provision of defibrillation services by police officers was introduced in a landmark paper in 1994 by Roger D. White, MD, and colleagues at the Mayo Clinic, in Rochester, Minnesota.[40] Ongoing results have been described in several subsequent papers.[5,20,41] These researchers used an observational outcome design to describe the effect of adding police AED capabilities to the existing EMS response system during a seven-year period beginning in 1990. Survival rates were comparable whether police

Participants

Host: National Center for Early Defibrillation
Chair: Vincent N. Mosesso, MD
Co-Chairs: Paul Paris, MD, and Mary Newman, BS
Moderator: Joseph P. Ornato, MD

Location	Organization	Panelists
Amsterdam, the Netherlands	Academic Medical Center	Anouk van Alem, MD
Boston, MA	City of Boston EMS	Kathryn Brinsfield, MD, George Murphy, EMT-P
Buffalo, NY	State University of New York at Buffalo	E. Brooke Lerner, PhD, EMT-P
Chicago, IL	University of Chicago	Michael R. Sayre, MD
Hackensack, NJ	Hackensack University Medical Center	Valerie Schoen, EMT-P
Indianapolis, IN	Indiana University, Bartholomew County Sheriff Department	William J. Groh, MD, Mary M. Newman, BS, Detective Jay Frederick
Lancaster, PA	Lancaster Heart Foundation	Leon Anderson, MD
Miami, FL	University of Miami	Robert Myerburg, MD
Murray, UT	Utah State Highway Patrol	Greg Dunnavant, MD, MS
Pittsburgh, PA	University of Pittsburgh, Tri-Community South EMS	Vincent N. Mosesso, MD, Philip Vargo, EMT-P
Rochester, MN	Rochester Police Department, Mayo Clinic	Deputy Chief Steve Johnston, Roger White, MD
Brentwood, NY	Suffolk County Police Academy	Police Officer Mitchell Savino, EMT-P

Observers

Organization	Observers
Agilent Technologies/ Heartstream Operation (now Philips Medical Systems/Heartstream)	Grace Day, James Russell, PhD
American Heart Association	Mike Bell, Mark Decker
Laerdal Medical Corporation	Darrell Isaac, Joe Pahlow
Medical Research Laboratories	William Smirles, EMT-P
Medtronic Physio-Control	René Mitchell, RN, Robert Niskanen, Alex Denogean
National Association of EMS Physicians	Robert Bass, MD, Robert Swor, DO
SurVivaLink Corporation (now Cardiac Science Corporation)	John Nealon
The Medtronic Foundation	Joan Mellor
Zoll Medical Corporation	Cliff King

Figure 3. National Center for Early Defibrillation (NCED) Police AED (Automated External Defibrillation) Issues Forum participants and observers.

TABLE 1. Summary of Published Law Enforcement Agency Defibrillation (LEA-D) Studies

	Rochester[5]	Pittsburgh[6]	Indiana[7]
Population studied	78,276	145,000	464,741
Area	38 sq mi	46 sq mi	2,326 sq mi
Population density per sq mi	2,060	3,152	53-389 (range) 200 (mean)
Number of AEDs placed	12	30	112
Defibrillators by sq mi	0.32 per sq mi	0.67 per sq mi	0.05 per sq mi
Defibrillators by population	1 per 6,523 pop	1 per 4,833 pop	1 per 4,149 pop
Total cases	246	249	388
Initial rhythm: VF/VT	131 (53%)	172 (45%)	180 (46%)
Call-to-shock interval: EMS first vs. police first	6.7 (2.0–13.2) vs. 5.9 (3.3–9.1); p = 0.023	9.4 (±3.9) [*n* = 52] vs. 8.2 (±3.0) [*n* = 75][63]	11.6 ± 7.8 vs. 6.9 ± 3.9; p < 0.0001
Call-to-shock interval: survivors vs. non-survivors	5.6 (2.0–9.6) vs. 6.9 (2.8–13.2); p < 0.001	NA	NA
Call-to-shock interval: control vs. intervention	NA	11.8 vs. 8.7 (p < 0.0001)	NA
% Police arrive before EMS	44%	59%	7%
VF survival: shock by EMS first vs. police first	41% (30/73) vs. 40% (23/58)	7.4% (6/81) vs. 26.1% (12/46)	10% (16/160) vs. 15% (3/20)
VF survival: control (historical) vs. intervention	NA	6% vs. 14% (p = 0.1)	7.8% vs. 10.6% (p = 0.38)

AED = automated external defibrillation; VF/VT = ventricular fibrillation; ventricular tachycardia; EMS = emergency medical services.

shocked first (40%; 23/58) or EMS shocked first (41%; 30/73). Further, researchers determined that return of spontaneous circulation (ROSC) in the field was associated with patient survival 97% of the time. Other important contributions from the Rochester research include recognition of the need for clock synchronization, identification of the "call-to-shock" interval as the key interval that can be measured objectively and reliably, and the determination that reducing call-to-shock intervals by even 1 minute improves survival.

Allegheny County, Pennsylvania

At about the same time that the Rochester research was getting under way, University of Pittsburgh researchers launched a prospective cohort study with historical controls to evaluate police AED programs in seven suburban communities in southern Allegheny County, Pennsylvania.[6] Historical data were retrospectively gathered from 1990 and 1991. During the intervention phase (1992–1995; *n* = 127), police were trained and equipped with AEDs. Police arrived before EMS in 61% of cases and the call-to-shock interval was 3.1 minutes shorter (p < 0.0001). When police arrived before EMS and administered shocks, VF survival was 26 % vs. 3% when police arrived first but did not administer shocks (p = 0.01). Researchers found that police use of AEDs decreased the time to defibrillation and was the only independent predictor of survival to hospital discharge. There was a trend toward improved survival among all patients in VF (6% vs. 14%, p = 0.1). The Pittsburgh researchers also evaluated AED training and performance among police officers and found that police performed at a level equivalent or superior to the performance level of emergency medical technicians (EMTs) and firefighters reported in previous studies.[31] In addition, they described the importance of developing and monitoring a system to evaluate training, compliance with protocol, and efficacy.[42]

Six Counties in Indiana

Researchers from the Krannert Institute of Cardiology, Indiana University School of Medicine, reviewed the effects of police AED programs through the Police As Responder Automated Defibrillation Evaluation (PARADE) trial conducted in six suburban and rural counties in Indiana.[7] In this study, historical data were gathered retrospectively during 1995–1996 and police AED capabilities were gradually introduced in six suburban and rural counties from 1997 through 1999. When police arrived first, call-to-shock intervals were shortened by 4.8 minutes (p = 0.008). However, police arrived before EMS in only 6.7 % of cases (26/388). Consequently, overall survival rates in the study communities did not improve after police were equipped with AEDs.

The low frequency of first response by police officers was attributed to many factors: insufficient police AED coverage for the geographical service area; responder reluctance associated with psychological barriers, such as discomfort with the role of AED provider and a lack of confidence in personal per-

formance; failure to dispatch police and EMS simultaneously; ambiguous, misunderstood, or inconsistently applied dispatch instructions; lack of formal emergency medical dispatch (EMD) training; prompt EMS response times; commitment to other law enforcement duties in progress at the time of the call; and concerns about personal liability risk.

Cincinnati, Ohio

A prospective controlled trial conducted in Cincinnati in 1997–1999 failed to show improvement in hospital discharge survival rates. The existing EMS system included paramedic-staffed ambulances and defibrillator-equipped fire vehicles in four police districts. In one of these districts, 33 police cars were equipped with AEDs and police and fire were dispatched simultaneously. Outcomes in the intervention district were compared with those in the three control districts. While the addition of police AED capabilities reduced the mean call-to-shock time by 27 seconds (median call-to-shock interval 515 seconds in test district, 542 seconds in control districts, $p = 0.054$), the intervention was not associated with improved survival.[43] A survey conducted among 69 police officers toward the end of the trial determined that while 63% felt adequately trained to use the device, 54% were concerned about liability risks and 39% were concerned about causing injury to patients with the AED.[44]

Miami–Dade County, Florida

During a five-month period in 1999, all police officers in Miami–Dade County were trained and equipped with AEDs. Police and EMS were dispatched simultaneously to potential SCA calls. Police arrived first in 76% of SCA cases ($n = 273$ cases) in an average of 5.6 minutes. This contrasts with the average EMS response time of 7.7 minutes. VF survival rates increased from 9.6% before police-AED intervention to 18.3% after police-AED intervention.[45] Subsequent data analysis on a larger sample indicates a persisting survival benefit for patients with shockable rhythms since inception of the program.[46]

Amsterdam, The Netherlands

A two-year randomized controlled trial, ARREST-4, got under way in Amsterdam in January 2000. It uses a crossover design in which police with AEDs serve half the population, while police without AEDs serve the other half. This treatment allocation is reversed every four months. Preliminary results suggest that police arrive at the scene an average of 2.5 minutes sooner than EMS. Among the 32 patients who were shocked first by police, VF was converted to an organized rhythm in 16 (50%), and seven patients (22%) survived to hospital discharge.[47,48]

Table 2. Variables Associated with Increased Likelihood of Survival in Published Law Enforcement Agency Defibrillation (LEA-D) Studies

Variable*	Rochester[5]	Pittsburgh[6]	Indiana[7]
Call-to-shock interval	X	X	X
ROSC with shocks only	X		
Call-to-scene interval			X
Bystander CPR			X
Age			X
Male gender			X
Collapse in public location			X
Use of AEDs by police		X	

*ROSC = return of spontaneous circulation; CPR = cardiopulmonary resuscitation; AED = automated external defibrillator.

Table 3. Annual Incremental Law Enforcement Agency Defibrillation (LEA-D) Program Costs[58]

1. Device(s), divided by the expected life of the device in years (generally about five years)
2. Peripheral equipment (e.g., electrodes, batteries, hand towels, scissors, exam gloves, pocket masks with one-way valves), divided by the expected life of the equipment in years
3. Device maintenance
4. Automated external defibrillator (AED) training
5. Incremental salary of program personnel (if applicable)
6. Event documentation, including data management equipment and software
7. Medical direction and quality assurance costs
8. Insurance

Conclusions from Published LEA-D Studies

A review of the published LEA-D studies (Rochester, Pittsburgh, and Indiana) indicates that significant improvements in survival were achieved in study communities with higher population density per square mile. In addition, they suggest that whereas the provision of CPR predicts survival in semi-rural areas, AED intervention predicts survival in urban and suburban areas (Table 1). Further, the only variable associated with improved survival in all three studies is the call-to-shock interval (Table 2).

Costs Associated with LEA-D Programs

Costs associated with LEA-D programs frequently are cited as a deterrent to program implementation (Table 3). However, research suggests defibrillation programs are cost-effective.[49] The cost of a first responder (police or fire) defibrillation program over five years, for example, ranges from an estimated $4,400 per year of life saved[50] to $8,000 per year of life saved.[51] This compares favorably with the cost per year of life saved considered acceptable for other medical interventions ($50,000 per quality-adjusted life year).[49] Moreover,

TABLE 4. Incremental Cost–Effectiveness of Reducing Time to Defibrillation by 1.9 Minutes per Additional Quality-adjusted Life Year (QALY)[59]

	Cost/QALY*
BLS-D (additional EMS units)	$191,100
Firefighter AED	$63,700
Lay responder AED	$46,700
Police AED	$29,000

*BLS-D = basic life support–defibrillation; EMS = emergency medical services; AED = automated external defibrillation.

the incremental cost of adding defibrillation services to established emergency response agencies is relatively small in comparison with the cost of adding additional units to EMS agencies (Table 4).

ISSUES DISCUSSION

Issue 1: Criteria to Identify Law Enforcement Agencies That Should Provide AED Services

Panelists recognized that LEA-D programs have not been proven to be a universally appropriate strategy for decreasing time to defibrillation. Further, there are no known data that predict the proportion of cases in which police would have to arrive first to make LEA-D programs effective and cost-effective. Despite this, panelists agreed survival rates may improve significantly in many communities with the implementation of LEA-D programs. Important research findings that should be considered are: 1) arriving even 1 or 2 minutes before EMS can improve survival[5]; 2) the percent of time police arrive before EMS is more important than the mean difference between police and EMS arrival times; and 3) to maximize survival, the mean response time (time from dispatch to arrival at scene) should be less than 8 minutes.[52] System adjustments (e.g., simultaneous dispatch of police and EMS, specific protocols) may make it possible for law enforcement agencies to achieve these objectives. Ultimately, adoption of an LEA-D program has to be a local decision that considers local resources and priorities.

Panelists also agreed that AED use by specialty police services, such as correctional officers, treasury police, search and rescue teams, and SWAT teams, may facilitate more rapid defibrillation than can be accomplished through EMS alone, in light of restricted access issues and the potential dangers of work sites and operational venues.

Issue 2: Integration of LEA-D Programs within the Public Safety System

Panelists discussed the need for integration of LEA-D programs with the EMS system to ensure an organized, reliable response that results in a seamless delivery of care. They acknowledged that turf issues sometimes arise, but agreed these can be overcome if addressed quickly and tactfully. They recommended involving EMS from the outset with program planning and implementation, the development of protocols, the provision of initial and refresher training, and medical direction. LEA-D protocols should be coordinated with protocols of other emergency response agencies and should address local transfer procedures. For example, they should consider whether police should continue treatment, assist EMS, or depart the scene; whether AED cable adaptors should be used; and whether EMS should take the AED or transfer data from the AED.

Issue 3: Dispatch

Panelists agreed that the dispatch system is critical to the success of any LEA-D program. They discussed the importance of emergency medical dispatch (EMD) training for dispatchers; pre-arrival instructions that include real-time coaching in CPR and AED techniques; simultaneous dispatch of first responders and higher-level providers, preferably through central dispatching; minimal call processing time; and methods for identifying the closest unit with a defibrillator, including utilization of mutual aid responders.

Panelists agreed that LEA-D dispatch protocols should: be specific and rigorous; identify complaints that trigger an automatic AED response; avoid over- or undertriage; be coordinated with protocols of other response agencies; and be reviewed and updated frequently (Table 5). They also discussed the importance of recognizing dispatchers as essential members of the lifesaving team, for example, in program planning and training and in awards and ceremonies honoring rescuers who help save a life. Incorporating these characteristics will require the commitment of dispatch center leadership, dedicated personnel time, and likely additional costs.

Issue 4: Medical Oversight

Panelists recognized that medical oversight may be a new concept for many law enforcement agencies, but concluded it is essential to ensure optimal patient care. They concurred that the qualifications of a LEA-D medical director include physician licensure, commitment, and familiarity with and interest in the prehospital environment, as described elsewhere.[53] The local EMS medical director should be considered for the position or consulted for recommendations of other qualified physicians.

Another suggestion was to appeal to local retired physicians who have the time and expertise to devote to the role of LEA-D medical director. The job description for a medical director includes oversight of the training, development of response and treatment pro-

tocols, regular face-to-face meetings with police chiefs and officers, case review, and follow-up.

Medical director compensation depends on local factors. LEA-D oversight could be assumed by the local EMS medical director or another government supported physician with little or no incremental payment. In smaller communities, physicians may opt to provide medical direction services on a voluntary basis. The local hospital may provide support for physician and staff involvement as a community outreach effort. Prospective medical directors should be aware of potential expenses such as travel and insurance coverage.

Issue 5: Training

Panelists agreed that the quality of AED training strongly influences the success of LEA-D programs. They agreed that high-quality programs have these characteristics in common: 1) a focus on device-specific, practical skills; 2) course duration based on skills acquisition and demonstrated competency; 3) training scenarios customized for local situations, including specific plans for transfer of care to EMS; 4) use of peer training; and 5) validated AED training with official recognition (e.g., course completion certificates) from a nationally recognized training organization. Panelists agreed that LEA-D training also should address fears that AEDs can harm operators or patients, liability concerns, and proper treatment for pediatric and non-shock cases. Local EMS agencies were recognized as a valuable resource for LEA-D training.

While there are no data to confirm the ideal frequency of refresher training, panelists recommended that at least initially retraining should occur on a quarterly basis to ensure skill maintenance and foster confidence. Some recommended conducting brief sessions at regular monthly meetings that review key police department policies and practices (roll call). Others recommended even more frequent reviews using one-on-one practice and/or computer-based refresher training. In general, panelists agreed that short, frequent review sessions are more helpful than longer infrequent sessions. After the program has been in place for several years, longer retraining intervals may be adequate. Panelists agreed that a standard approach to refresher LEA-D training would be helpful.

Panelists recommended that devices include or enhance real-time coaching capabilities. They noted that the American Society for Law Enforcement Training (ASLET) could potentially play a key role in developing and promulgating LEA-D training. Finally, panelists recommended that AED training become a core component of basic training in police academies and considered a basic skill for all law enforcement personnel.

Table 5. Complaints That Should Trigger Dispatch of Police with Automated External Defibrillators (AEDs)[60]

Unconsciousness
Chest pain or tightness in chest
Radiating pain, especially in left arm
Unexplained falls with altered mental state or loss of consciousness
Collapse after exertion
Dizziness in patient over age 35
Not breathing normally
Blow to chest with loss of consciousness
Erratic pulse
Drowning
Electrocution
Asphyxiation
Stroke reported by bystander

Note: A report published after the National Center for Early Defibrillation (NCED) Police AED Forum[61,62] suggests that certain dispatch protocol determinant codes have high "cardiac arrest quotients," which can help predict the likelihood that an AED will be needed on scene.

Issue 6: Liability

Research[7,43] and experience suggest that concerns about legal liability risks related to the use of AEDs are a serious issue for many police departments and officers. Panelists concluded that LEA-D programs should recognize these are important concerns that may dissuade police departments from adopting AED programs and may delay effective response on the part of individual police responders.

Panelists agreed that LEA-D programs should include education on the facts surrounding this issue. First and foremost, AEDs are easy to use and difficult to misuse. In addition, proving causation of harm through AED use is difficult, considering the fact that devices are intended for use in individuals who are already clinically dead. Further, state and federal Good Samaritan legislation protects individuals who render emergency medical assistance, including treatment with an AED, in good faith. (Note: This protection does not always extend to professionals who are rendering assistance as part of their professional duties, and as such it is prudent to examine applicable laws and regulations.) Finally, case law favors AED deployment, raises the question of liability risks associated with failure to provide defibrillation services, and has found that Good Samaritan legislation implicitly authorizes AED use by laypersons.[54]

Issue 7: Personnel

Panelists discussed the psychological issues that may affect LEA personnel, particularly disagreement or uneasiness with the role of medical provider and AED use. They recommended validating and addressing these feelings and perceptions through: 1) discussions with personnel about their perceptions and concerns; 2) surveys conducted among personnel before and after introduction of the program (in which respon-

TABLE 6. Ten Attributes of Successful Law Enforcement Agency Defibrillation (LEA-D) Programs[39]

1. The ability to respond quickly and reliably to medical emergencies
2. A supportive medical response culture within the LEA
3. Strong champions in the community and within the LEA who serve as program advocates
4. Integration with the emergency medical services (EMS) system
5. An effective, coordinated dispatch system
6. A proactive, "hands-on" medical director
7. A designated program coordinator
8. Effective, competency-based initial and refresher training
9. Familiarity with applicable laws and regulations and attention to liability concerns
10. An effective Continuous Quality Improvement (CQI) program, including written policies and procedures and data collection and analysis

dents can remain anonymous) to determine perceptions and concerns and address opportunities for program enhancement; 3) the provision of psychological support after cardiac arrest responses through critical incident stress debriefing; 4) prompt follow-up by the medical director and program administrator with AED providers following each case in which resuscitation was attempted; 5) initial and refresher training that results in sustained competence and confidence; and 6) positive feedback and celebration of successes. Panelists also recommended that program leaders avoid setting unrealistically high expectations for improved survival.

Panelists acknowledged that workforce and union issues can affect LEA-D programs. In some locations, the questions of compensation for training time and expanded roles, and the potential for discord between chiefs and officers may need to be addressed.

Issue 8: Program Coordination

Panelists agreed that for an LEA-D program to be effective, it is essential to have a program coordinator who serves as a liaison between the medical director, the police chief and police officers, and who has specific managerial duties. The medical director and program coordinator should work together to develop policies and procedures for the LEA-D program. These should address: initial and refresher training requirements, patient care protocols, dispatch protocols, synchronization of timepieces, device deployment, device maintenance checks, device storage in extreme weather conditions, supply checks (e.g., spare batteries and electrodes), data collection and reports, case review, critical incident stress debriefing, and outreach efforts to stimulate public awareness of the LEA-D program and the need for bystander intervention and layperson CPR training.

Issue 9: Equipment

There are several AED models on the market that have Food and Drug Administration (FDA) clearance. Panelists did not endorse any particular device, waveform, or brand. Panelists agreed that funding for equipment has been a major impediment to program implementation and further acknowledged that the costs of training and administration of the program may exceed the cost of devices themselves. However, they viewed device costs, in comparison with other LEA equipment, as relatively minor.[55] Further, they advised that to minimize costs, police departments consider group purchasing of devices and maintenance agreements.

With regard to device selection, panelists agreed it is not essential for devices selected by law enforcement agencies to be compatible with devices used by local EMS systems; however, similarity of devices may simplify training, data collection, and administration. Human factors (e.g., the degree to which the device is user-friendly and intuitive) also should be considered.

Panelists advised that if agencies decide to adopt AED programs and officers use take-home cars, it is ideal to equip each officer—not each patrol zone—to maximize community coverage. Case reports in which off-duty officers resuscitated SCA victims support this strategy.[56]

Panelists also recommended the following design enhancements: real-time video coaching on CPR and AED techniques; more efficient data recording and transfer capabilities, including a standardized ECG data storage format; automatic time synchronization; incorporation of communications capabilities that enable interface with other public safety agencies; capabilities to treat pediatric patients; simplified pad placement (e.g., incorporating electrodes into a vest); and greater uniformity of device design.

Issue 10: Quality

To ensure the quality of the LEA-D program, panelists recommended: regular protocol review; regular refresher training and documentation of competency; scheduled, documented equipment maintenance checks; prompt review of each cardiac arrest in the service area to determine whether police responded, whether they arrived first, whether they used the AED, whether they used the AED properly, whether other actions such as CPR were conducted properly, and whether the AED functioned properly; positive, constructive feedback and corrective action as needed; and data collection and review to evaluate the impact of the program on survival and to monitor trends. Police AED Issues Forum panelists emphasized the need for data collection to monitor the effect of local LEA-D programs on survival from sudden cardiac arrest.

Summary

Why does LEA-D intervention seem to work in some systems but not others? Panelists agreed that some factors that delay rapid access to treatment, such as long travel distances in rural areas, may represent insurmountable barriers. Other factors, however, may be addressed more readily. These include: absence of a medical response culture, discomfort with the role of medical intervention, insecurity with the use of medical devices, a lack of proactive medical direction, infrequent refresher training, and dependence on EMS intervention. Panelists agreed that successful LEA-D programs possess ten key attributes (Table 6).[39]

In the end, the goal remains "early" defibrillation, not "police" defibrillation. It does not matter whether the rescuer wears a blue uniform—or any uniform, for that matter—so long as the defibrillator reaches the victim quickly. If LEA personnel routinely arrive at medical emergencies after other emergency responders or after 8 minutes have elapsed from the time of collapse, an LEA-D program will be unlikely to provide added value. Similarly, if police frequently arrive first, but the department is unwilling or unable to cultivate the attributes of successful LEA-D programs, efforts to improve survival may not be realized.

In most communities, however, LEA-D programs have tremendous lifesaving potential and are well worth the investment of time and resources.[42,57] Law enforcement agencies considering adoption of AED programs should review the frequency with which police arrive first at medical emergencies and LEA response intervals to determine whether AED programs might help improve survival in their communities. It is time for law enforcement agency defibrillation to become the rule, not the exception.

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