

- 1 Cardiovascular Health Branch, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention. *Circulation*. 2001;104:2158-2163.
- 2 Gillum RF. Sudden coronary death in the United States: 1980-1985. *Circulation*. 1989;79:756-765.
- 3 American Heart Association. Chapter 4: Defibrillation. *Textbook of Advanced Cardiac Life Support*. RO Cummins, MD, MPH, Msc, editor. American Heart Association; Dallas, TX;1994;(4)1-2.
- 4 Fletcher GF, Cantwell JD. Ventricular fibrillation in a medically supervised cardiac exercise program. *JAMA*. 1977;238:2627-2629.
- 5 Cummins RO, Ornato JE, Thies WH, Pepe PE. Improving survival from sudden cardiac arrest: the chain of survival concept: a statement for health professionals from the Advanced Life Support Subcommittee and the Emergency Cardiac Care Committee, American Heart Association. *Circulation*. 1991;83:1832-1847.
- 6 Valenzuela TD, Roe DJ, Nichol PH, et al. Outcomes of rapid defibrillation by security officers after cardiac arrest in casinos. *New Engl J Med*. Oct 2000;343:1206-1209.
- 7 Mattioni TA, Nademanee K, Brodsky M, et al. Initial clinical experience with a fully automatic in-hospital external cardioverter defibrillator. *Pacing Clin Electrophysiol*. 1999 Nov;22(11):1648-1655.
- 8 Bain AC, Swerdlow CD, Love CJ, et al. Multicenter study of principle-based waveforms for external defibrillation. *Ann Emerg Med*. 2001;37(1):59-60.
- 9 American Heart Association. Guidelines 2000 for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation*. 2000;102(Suppl):I-60-I-76
- 10 Takata TS, Page RL, and Joglar JA. Automated external defibrillators: technical considerations and clinical promise. *Ann Int Med*. Dec 2001;135(11):990-998.



THE SCIENCE OF SURVIVAL



CARDIAC SCIENCE

Nasdaq: DFIB

For further information contact Cardiac Science at:

1.800.991.5465 (USA ONLY) E-mail: powerheart@cardiacscience.com
 +45.44.38.05.00 (International) www.cardiacscience.com

Corporate Headquarters

1900 Main Street, Suite 700
 Irvine, CA 92614 USA
 Phone: +1 949.797.3800
 Fax: +1 949.951.7315

Minneapolis Operations

5420 Feltl Road
 Minneapolis, MN 55343 USA
 Phone: +1 952.939.4181
 Fax: +1 952.939.4191

International Operations

Kirke Vaerloesevej 14
 DK-3500 Vaerloese DENMARK
 Phone: +45.44.38.05.00
 Fax: +45.44.38.05.01

Powerheart, RescueReady, RHYTHMx, and MDLink are trademarks of Cardiac Science, Inc. registered in the U.S. Patent and Trademark office. Intellisense, Data Storm, and Powerheart CRM are trademarks of Cardiac Science, Inc. Windows is a registered trademark of Microsoft Corporation. All other trademarks are the property of their respective owners. U.S. Patents 4,576,170; 5,402,884; 5,474,574; 5,579,919; 5,645,571; 5,792,190; 5,984,102; 6,101,413; 6,125,298; 6,125,299; 6,148,233; 6,289,243. Other U.S. and foreign patents issued and pending. ©2003 Cardiac Science, Inc. All rights reserved.



CARDIAC SCIENCE



Sudden cardiac arrest kills more than 450,000 Americans each year, making it a major public health problem and the leading cause of death in the United States. Stroke and lung cancer, the next two highest causes of death, claim fewer victims combined.¹

diac Arrest

CARDIAC SCIENCE IS TAKING AIM AT SOCIETY'S NUMBER ONE KILLER.

WHY SUDDEN CARDIAC ARREST IS SO DEADLY.

Sudden cardiac arrest (SCA) is the most common cause of death from heart disease, accounting for more than 63 percent of all cardiac deaths. In SCA, the heart suddenly stops beating normally. The electrical impulses that control the rhythm of the heart become so disorganized that the heart begins beating at an abnormally rapid and chaotic pace and can no longer effectively pump blood to the body or oxygen to the brain. Without a blood supply, oxygen-starved organs are irreversibly damaged and will quickly fail.

The only effective treatment for SCA is defibrillation. External defibrillation provides a brief, effective therapeutic electric shock through the person's chest to the heart, restoring the heart's normal rhythm.

While people with heart problems are at high risk of death from SCA, it can strike anyone, anywhere, at any time without warning and in some cases is the victim's only symptom. Even young people, people who appear to be healthy, and people with no history of heart problems can be victims of this silent killer.

TIME IS THE KEY TO SURVIVAL.

Survival statistics for SCA victims are grim. Currently, a person who suffers SCA outside a hospital has only about a 5% chance of surviving. Even in the hospital, survival averages about 15% and has not improved since the 1960's.²

Time is the key factor in survival. For the best chance of survival, a defibrillation shock has to be delivered very soon after the onset of a life-threatening heart rhythm. For every

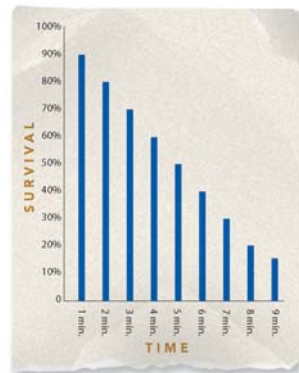
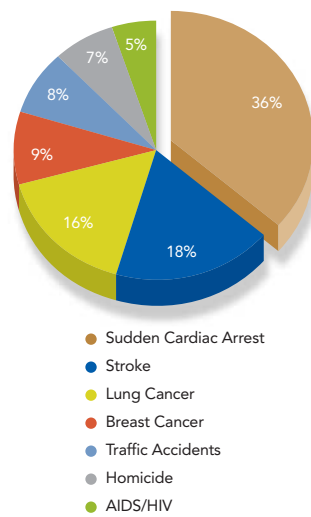
minute that passes prior to receiving a defibrillation shock, a victim's chances of survival decline by about 10%.³ The ability to immediately defibrillate saves lives, minimizes brain damage, and reduces complications. Even SCA survivors may have irreparable heart and brain damage and a diminished quality of life if treatment is delayed for just a few minutes. Clinical studies show that when cardiac arrest victims are defibrillated immediately, more than 90% survive.⁴ Even in a hospital today, traditional resuscitation procedures many times result in significant delays before an SCA victim receives defibrillation therapy. It's not due to lack of dedication or skill. It's just the human limitation of current practice.

OUR MISSION: STOP THE KILLER.

The American Heart Association has determined that time to defibrillation is the single most important factor in the survival of SCA victims, and estimates that prompt defibrillation could save as many as 100,000 lives every year.⁵

The mission of Cardiac Science is to provide safe, vigilant, and intelligent cardiac monitoring and defibrillation technology that significantly reduces time to defibrillation and saves lives. Our objective is to raise the standard of care for cardiac arrest victims both inside and outside the hospital. To that end, Cardiac Science develops, manufactures and markets advanced, lifesaving automatic external cardiac defibrillator technologies that are fast, effective, and extremely easy to use.

Causes of death annually for all Americans



TIME TO DEFIBRILLATION

For every minute without defibrillation, the victim's likelihood of survival diminishes by 10%.



SLOW RESPONSE IS THE LIMITING FACTOR.

Survival rates for people experiencing SCA both in and out of hospitals remain low. Yet it is widely known that external defibrillators are virtually 100% effective in terminating cardiac arrest and that reducing time to defibrillation is the most critical factor in saving the lives of SCA victims.

According to a *New England Journal of Medicine* study conducted in casinos in Las Vegas,⁶ 74% of gamblers who suffered SCA survived after getting defibrillated within 3 minutes. Now that American Airlines has installed automated defibrillators aboard its aircraft, 40% of SCA victims survive. A study conducted in a cardiac rehabilitation facility showed that when cardiac arrest victims are defibrillated in less than 2 minutes, more than 90% survive.⁴

Once it is determined that a person is in cardiac arrest, the current approach outside hospitals is calling 911—and hoping the first responder arrives on the scene with a defibrillator. Unfortunately, fewer than half of the nation’s ambulance services, less than 15% of emergency service fire units, and less than 2% of police vehicles are equipped with automated external defibrillators (AEDs).

The hospital has its own version of calling 911—the dispatching of a highly trained “code” team armed with a traditional manual defibrillator. How fast the team arrives depends on nurse staffing levels, time of day, how fast SCA is recognized, and location of the defibrillator. Delays of several minutes are typical and, accordingly, survival rates remain low.

REDUCING THE DELAY.

In order to provide a technology solution to SCA, Cardiac Science developed RHYTHMx™ software technology, a patented software detection algorithm. The RHYTHMx algorithm is the “brains” in the box.

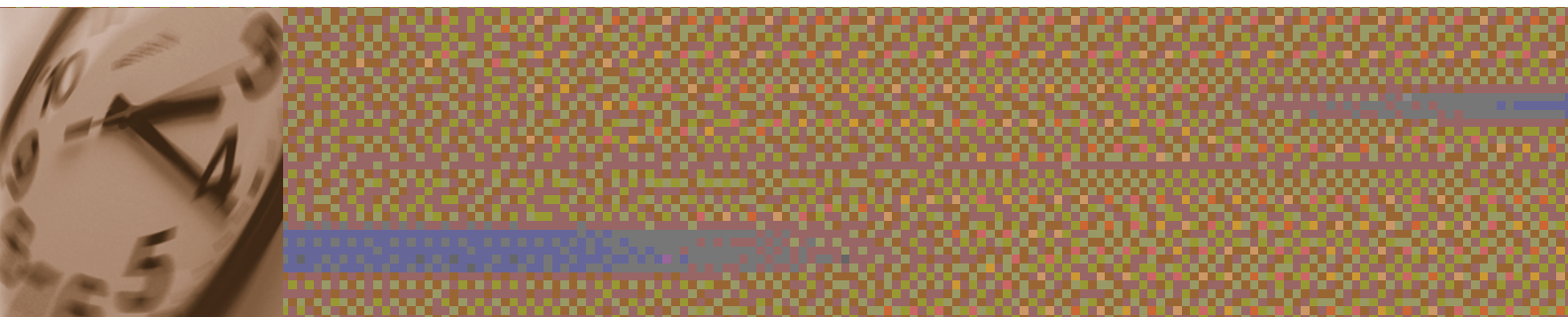
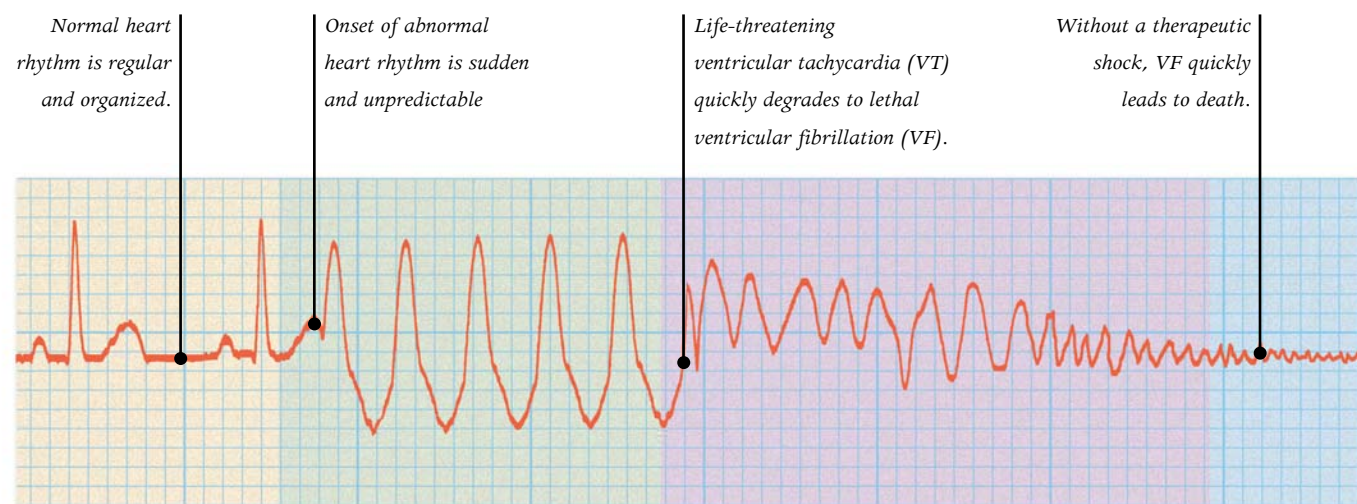
RHYTHMx TECHNOLOGY MAKES HARD DECISIONS FAST.

This sophisticated software technology combines advanced signal filtering, extraction, and waveform discrimination algorithms. RHYTHMx instantly and accurately detects abnormal heart rhythms, determines whether they are life-threatening and, when appropriate, facilitates the delivery of a defibrillation shock.

CLINICAL DATA DEMONSTRATE EFFECTIVENESS.

Published clinical data have proven that RHYTHMx technology correctly identifies life-threatening ventricular tachyarrhythmias with 100% sensitivity (identification of a life-threatening abnormal heart rhythm) and 99.4% specificity (delivering a shock when needed and not delivering one when not appropriate).⁷

RHYTHMx technology is incorporated into the Powerheart® CRM™ bedside monitor-defibrillator and the Powerheart AED, enabling both products to provide the fastest, safest and most effective response possible.





Therapeutic monitoring with the Powerheart CRM bedside monitor-defibrillator protects cardiac patients with instant detection of VT/VF and immediate defibrillation treatment.



“By providing consistently rapid identification of and response to tachyarrhythmias, the Powerheart system will significantly reduce mortality and morbidity associated with in-hospital cardiac arrest.” Thomas A. Mattioni, M.D., Arizona Heart Institute

ESTABLISHING A NEW STANDARD OF CARE.

Hospitals and clinics around the world are deploying Powerheart CRM therapeutic monitors. Because it's a monitor as well as a defibrillator, it can provide surveillance and protection for *any* patient in a hospital or clinic. And for the first time in 40 years, the rate of survival from SCA in these institutions has begun to improve significantly. The reason is simple. No crash cart team can respond as quickly and effectively as Powerheart. The entire process—from onset of abnormal heart rhythm to successful conversion to a normal rhythm—takes only seconds and does not require human intervention.



Designed to be replaced every 24 hours, the Powerheart CRM electrodes provide outstanding performance and patient comfort.

Powerheart is creating a new standard of care in hospitals because it's a proactive solution rather than a reactive one. Powerheart also employs a patented SVT Discrimination Function™ that accurately discriminates between shockable ventricular tachyarrhythmia (VT) and non-life-threatening supraventricular tachyarrhythmias (SVT). The net result is that Powerheart quickly and automatically delivers therapeutic shocks when necessary—and *only* when necessary. Based on the safety and effectiveness of RHYTHMx technology, Powerheart is the only bedside monitor-defibrillator cleared by the FDA to be prophylactically attached to hospital patients and provide automatic defibrillation therapy without human intervention.

INTEGRATES EASILY WITH EXISTING HOSPITAL SYSTEMS.

Powerheart can operate independently or in conjunction with any standard patient monitoring system. It monitors and provides therapy to the patient through proprietary disposable electrode pads optimized for comfortable daily wear. An external pacing

feature allows immediate treatment for symptomatic bradycardia events. User-friendly programmable interface display and controls allow easy navigation and programming. And since Powerheart is portable and battery-operated, it can be connected to patients while they are being transported within the hospital.

IMPROVING READINESS THROUGHOUT THE FACILITY.

CARDIAC ARREST CAN STRIKE ANYONE.

Cardiac Science AEDs make it cost-effective for a medical institution to provide widespread protection against SCA events in their facility. Like any other location where people gather—and even more so—medical facilities are rapidly taking advantage of this new AED technology to protect patients, visitors, and staff from the unpredictable and potentially devastating effects of SCA.

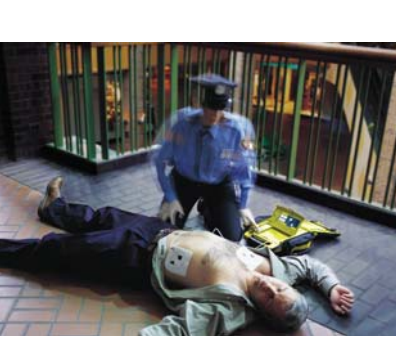
BEDSIDE-QUALITY PROTECTION IS NOW AVAILABLE EVERYWHERE.

Cardiac Science AEDs are designed to be simple for anyone to use and employ the same RHYTHMx technology as our sophisticated hospital bedside system. And all Cardiac Science AEDs have RescueReady technology to make absolutely sure the unit will function properly when it's needed.



The Powerheart AED is the only portable external defibrillator that can monitor—as well as treat—life-threatening irregular heart rhythms.

“In the first four months following installation of the Powerheart devices we had many interventions by the Powerheart. All patients were successfully returned to a normal cardiac rhythm in a matter of seconds. There was no need to deploy our crash-cart team and, amazingly, none of our patients required intubation.” Louise Valerio, R.N., Executive Director of Cardiovascular Services, Maimonides Medical Center, Brooklyn, NY



“The next day, I woke up in the hospital and found out I had suffered a sudden cardiac arrest and my heart was in fibrillation. It just happened that the partner I picked was one of two people who had been trained the month before. He had the defib with him, applied it, and saved my life. And I’m here today.” Chief Lee Donohue, Honolulu Police Department

“One day I hope AEDs will become as common as fire extinguishers. The plain and simple truth is that these devices save lives, and to that end, it’s almost a liability not to have easy access to AEDs.” Chip Boehm, RN, EMT-P/Firefighter

Often first on the scene, the police officer has the best opportunity to save a cardiac arrest victim.

PATROLLING THE BEAT.

Cardiac Science AEDs are the overwhelming first choice among police departments throughout America. Easy one-button operation, reliable RescueReady technology, and rugged simplicity have made it the preferred AED employed in police vehicles in the field.

POLICE ARE OFTEN FIRST ON THE SCENE AND ARE INCREASINGLY PREPARED.

More than 1,200 people a day die from sudden cardiac arrest. It’s a problem in every community. Lives can be saved if the first responder, typically a police officer or firefighter, has immediate access to a defibrillator. Studies show that when an AED is readily available and used within minutes of onset of SCA, most victims survive. The Rochester, Minnesota police became the first police department in the country equipped with AEDs. Since then, cardiac arrest survival rates in Rochester have nearly doubled. Deploying AEDs in your vehicles and being ready to save lives allows you to better serve and protect your community. It’s not difficult. Cardiac Science AEDs are easy to use and require very little training.

THE POWERHEART AED IS AN EFFECTIVE DEFENSIVE WEAPON.

The faster a potential SCA victim is attached to a Powerheart AED and monitored, the greater the chance of survival. Emergency medical personnel typically arrive too late to successfully treat cardiac arrest victims. So first responders have to be prepared. Although most police officers are trained in CPR, statistics show that CPR without defibrillation has virtually no effect on survival rates. CPR benefits for cardiac arrest victims are temporary and cannot restore normal heart function. Only defibrillation shock can stop cardiac arrest. With police routinely carrying AED units into the field, more lives can be saved.

EVEN POLICE OFFICERS ARE VULNERABLE.

Police officers are among the highest-risk groups for death from sudden cardiac arrest. Whether in training or on duty out in the field, there’s always a risk an officer will suddenly become a victim. In fact, many police officers, on and off duty, have been saved by fellow officers with a Cardiac Science AED.

RESPONDING TO THE ALARM.

Every year, hundreds of thousands of Americans die from cardiac arrest before they reach the hospital. EMS often comes too late. Like police officers, firefighters are often first on the scene when there’s an emergency. That’s why fire departments everywhere are starting to carry Cardiac Science AEDs as standard equipment.

FIREFIGHTERS ARE FREQUENT VICTIMS.

More than 40% of firefighter deaths are due to sudden cardiac arrest. It comes with the territory. The environment is inherently stressful. And the physical demands are extreme. Perhaps more than any other group, firefighters benefit themselves as well as their communities by carrying AEDs.

Firefighter deaths by nature of injury, 1997

Police

“Public access defibrillation, which places AEDs in the hands of trained laypersons, has the potential to be the single greatest advance in the treatment of cardiac arrest due to ventricular fibrillation since the development of CPR.”⁹ American Heart Association



“It is our belief that Cardiac Science manufactures the best and easiest to use AED on the market....the company also demonstrated its commitment to collaboration and shared our vision of promoting this lifesaving technology through a creative public-private partnership.” August F. Ghio, Deputy Fire Chief, City of San Diego, CA

A SAFE COMPANY IS EVERYBODY'S BUSINESS.

PUTTING TIME ON YOUR SIDE.

Sudden cardiac arrest can strike anyone, anywhere, even at work. The larger the company, the larger the risk. So it's extremely important that every company be prepared to respond quickly to a cardiac arrest. In fact, AEDs are quickly becoming standard equipment in America's leading corporations. It's an inexpensive insurance policy against potentially tragic loss of life—and one of the soundest investments a company can make. In December 2001, the U.S. Occupational Safety and Health Administration (OSHA) issued a technical bulletin stating that AEDs are effective, easy to use, and inexpensive. And they urge “employers to consider deploying AEDs at worksites to reduce time to defibrillation with the goal of improving survival.”

COMPANIES NO LONGER RELYING ON EMERGENCY SERVICES.

With every minute after onset of a lethal arrhythmia, the victim's chance of survival is reduced by 10%. Unfortunately, statistics

show that emergency services just can't get there fast enough. The national average response time for emergency medical services is over 10 minutes. In congested cities and rural areas, the response time is even longer. So emergency services aren't the answer. Without AEDs on premise, nearly all heart attack victims die. When AEDs are available and used quickly, most victims survive. In response, companies are establishing their own response capability to protect their employees and guests from this unpredictable and merciless killer.

IT'S A MATTER OF DOLLARS AND SENSE.

Many companies—such as Ford, GE, and Exxon—have recognized that it makes good economic sense to institute an effective AED program. There are clear economic benefits. The loss of a key employee to cardiac arrest can be far more costly than establishing an AED program.



A recent OSHA press release emphasizes the importance of making AEDs available in the workplace.

“While sitting at my desk I collapsed, later to find out that it was sudden cardiac arrest. My coworker heard me fall back in my chair and alerted our company's emergency response team—a group of trained employee volunteers. They hooked me up to our Cardiac Science AED in a matter of minutes and were able to defibrillate my heart and save my life before emergency medical personnel arrived at the scene.”

Paul Corcoran, Computer-Aided Designer, Multi-Tech Systems, St. Paul, Minnesota

PUBLIC AGENCIES ARE CRACKING DOWN ON CARDIAC ARREST.

GOOD HEALTH IS GOOD POLICY.

Public safety is the primary concern for all public officials. The public expects to be safe in municipal locations. So do public workers. Widespread deployment of AEDs helps protect citizens, reduce risk, and save lives. Experience has shown that the cost-benefit ratio of a well-planned Public Access Defibrillation (PAD) program will result in reductions in the cost of emergency services.

It's becoming a major national issue. The effectiveness of AEDs recently prompted governmental agencies and Congress to pass laws regarding the availability and usage of the devices. In late 2000, Congress passed the Cardiac Arrest Survival Act (CASA), which calls for the placement of AEDs in federal facilities across the nation and extends Good Samaritan protection to AED users in states that do not currently have protective legislation. In April 2001, the Federal Aviation Administration ruled that every domestic commercial and charter airplane in the country be required to carry defibrillators, and more recently, OSHA has prompted employers to deploy AEDs at their worksites. AEDs are simply a good idea whose time has come.

MUNICIPAL PROGRAMS ARE EASY TO ESTABLISH.

Community PAD programs easily gain political support and financial backing. A variety of agencies are typically involved, so costs and responsibilities can be distributed. Cardiac Science and the City of San Diego developed the first public-private partnership to deploy hundreds of AEDs in police and emergency vehicles and places where the public gathers. The goal of the program is to make San Diego America's first truly heart safe city. Many others have followed suit. So a lot of the planning has already been done. Cardiac Science routinely works with state, city, and local agencies and organizations to tailor appropriate programs for each entity.

AEDS ARE BECOMING INCREASINGLY COMMON.

Many other municipal, transportation, and recreational facilities are also becoming heart safe zones. And they are already beginning to experience dramatic lifesaving results. For example, in a study published in the *Annals of Internal Medicine*,¹⁰ researchers reported that in the first 10 months of a PAD program at Chicago's O'Hare International and Midway airports, 14 cardiac arrest victims were treated with AEDs and the survival rate was 75%.

AED units are small, portable, and self-contained—they can be placed in a variety of locations for ready access.



Indianapolis International Airport, Orlando International Airport, Colorado Springs Airport, Nashville International Airport, St. Louis International Airport/Lambert Field, Tampa International Airport, and Tucson International Airport have all recently installed Cardiac Science AEDs.



Physical stress is common in academic sports.

MAKING SCHOOLS SAFE IS AN EDUCATED DECISION.

IT'S IN THE NEWS.

In August 2001, Deandre Hillman died of sudden cardiac arrest at the young age of 17. He was two games into a hot night on an outdoor basketball court in Columbus, Ohio. The 6-foot-5 varsity player at Whitehall Yearling High School had a chance to be very good. But while his friends poured cold water over him, his heart quivered uncontrollably and then simply stopped. Shortly after this sobering event, professional basketball player Samaki Walker, Hillman's uncle, got involved with Start-A-Heart, a nonprofit organization that provides AEDs to schools and other public facilities.

There are many news stories just like this one about students who die of sudden cardiac arrest. It's not

Cardiac arrest can strike anywhere.

surprising. People often have hidden cardiac problems that can show up suddenly—and tragically—at any age. So it's also no surprise that Cardiac Science AEDs are being deployed on playing fields, cafeteria walls, and hallways on campuses all over the world.

STUDY THE LITERATURE.

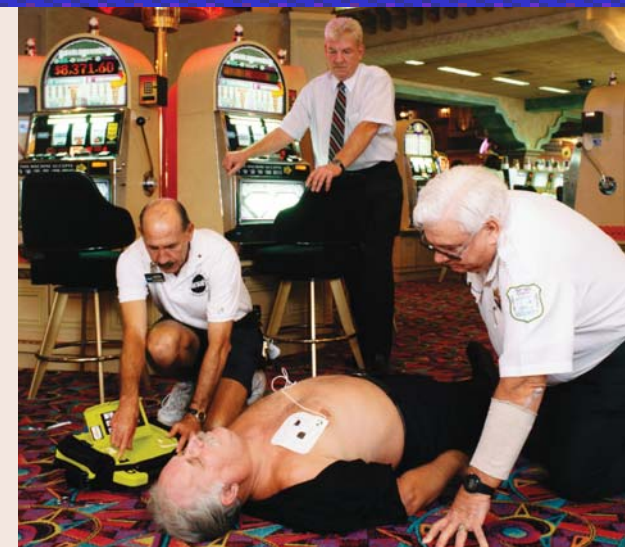
Young people die from cardiac arrest on American school and college campuses every year. Most of them could probably have been saved with prompt defibrillation. The sad reality is that anyone can be a victim—even young and seemingly healthy people. That's why Cardiac Science is making a concerted effort to work with local schools and national educational institutions to increase awareness and help campuses be prepared to respond immediately with AEDs.



Simple to use and self-contained, the Powerheart AED can be placed in a wide variety of locations.

CASINOS IMPROVE THE ODDS

According to a study published in *The New England Journal of Medicine*, Las Vegas casinos are the safest place in America to have a cardiac arrest. Trained security officers were able to save more than 74% of guests who suffered SCA by shocking victims with an AED within 3 minutes of the onset of the arrest. As a result, in casinos outfitted with AEDs, overall survival from SCA has increased fivefold.



REAL HOSPITALITY INCLUDES THE SAFETY OF YOUR GUESTS.

PREPARED FOR THE UNEXPECTED.

On a cruise ship on the way from Florida to Mexico in 2000, 29-year-old Mike Robie collapsed in the dining room. The ship's doctor suspected an abnormal heart rhythm and immediately used one of the ship's AEDs to shock his heart back into a normal rhythm. Recalling the incident later, Robie was extremely grateful the ship had an AED onboard. It's becoming a trend. A leading entertainment company recently deployed more than 100 AEDs at their flagship theme park in Southern California.

Other amusement parks and hotels around the country, such as Knott's Berry Farm and Marriott Hotels, are placing AEDs in conspicuous locations to let people know they're safe from SCA while patronizing their establishments.

VISIBLE PROTECTION IS A REAL CROWD PLEASER.

When you're responsible for accommodating a large number of guests, you should consider making sure AEDs are readily available. It just makes sense.



Strategically placed AEDs help tourist destinations prepare for the unexpected.

EXCITEMENT CAN TURN TO TRAGEDY IN THE BLINK OF AN EYE.

"With Cardiac Science AEDs readily available throughout our hotels and casinos, we feel confident knowing that, if one of our guests suffers from a sudden cardiac problem, we can dramatically improve their odds of surviving."

Jerry LaChapelle, Director of Risk Control, Harrah's Entertainment, Inc.

"It's a great relief to the school board that we've successfully implemented an AED program in our district. Besides the liability issues, we all feel better knowing that we are prepared to deal with potentially devastating human tragedies on our campuses."

Martin Handler, Superintendent of Schools, Sullivan County (Upstate New York)

