First On The Scene

Abbreviated Version

A Toolkit For EMS & First Responder Agencies





Sudden Cardiac Arrest Association

Power and passion, saving lives

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Sudden Cardiac Arrest Association First Responder Toolkit

Contents

Introduction and Foreword	1
Facts about Sudden Cardiac Arrest, Emergency Procedure, CPR, and AEDs	3
Chain of Survival: An Overview	10
Identifying Community Needs	11
Screening progams: what, how, and why	15
Community Preparedness: (community preparedness, emergency action plans, AED access, education programs)	20
About the Sudden Cardiac Arrest Association	29



By the end of the year, the number of deaths due to sudden cardiac arrest (SCA) will reach approximately 300,000. Based on this number, one might expect that SCA is some newly identified condition that researchers are just now beginning to understand. As a first responder, you know that the opposite is true.

For the past three decades the national survival rate of sudden cardiac arrest (SCA) has remained a low five percent. Efforts in recent years to increase public education of SCA have been met with mixed results. Several state laws are requiring AEDs to be located in public areas, yet federal legislation that would expand access to these lifesaving devices continues to be defeated. CPR guidelines have been revised to focus on chest compressions and thereby encourage more bystander assistance. Still, most people who witness a heart attack or cardiac arrest do not know how to perform CPR. What we are left with is a country unfamiliar with SCA until it's too late: when media reports inform us of a young student dying unexpectedly at school.

The Sudden Cardiac Arrest Association (SCAA) - the nation's leading nonprofit advocacy organization exclusively dedicated to SCA – is working to establish a national approach to SCA, where prevention, response and treatment are universal and each resident has the same fighting chance of surviving. Our 5,000+ members are SCA survivors, patient advocates, medical professionals, emergency responders and educational administrators all dedicated to increasing awareness of SCA and expanding access to AEDs and other life-saving treatments and therapies within their local communities.

This is a worthy challenge that we cannot meet alone. First responders play a vital role in the chain of survival, and it is our hope that you will join our efforts to increase awareness of the public health crisis of SCA. I encourage you to read through this booklet and see how you can make positive change within your local community, and I hope the resources and materials enclosed will serve as powerful tools in your public outreach efforts. As emergency responders, you serve on the front lines of critical care, often making first contact with patients in a time of most need, and we welcome and value your participation.

Government health officials tout the fact that more people are surviving cancer as a result of increased awareness, early detection and other preventive measures. With your help, the same could be said of SCA.

We look forward to working with you on this mutually beneficial goal and in doing so, increase public understanding of the invaluable role of first responders.

Yours in prevention,

Lisa A. Levine, CAE President, SCAA



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This toolkit is aimed specifically at EMS and First Responder agencies and providers because SCAA believes you are in one of the most advantageous positions to take actions that will lead to improved survival from out of hospital cardiac arrest. EMS and First Responders sit at the crossroads between health care and the community. You are respected and trusted in your community. You have the medical understanding and expertise to know what needs to be done and the positioning and capabilities to accomplish much.

Many resuscitation experts believe that the most effective way to improve the currently dismal survival of about five percent is to increase the frequency of bystander CPR and AED use-immediate bystander care is crucial to survival. This toolkit will provide you with ideas, methods and resources to help you reach out to your community and improve the rate of immediate bystander action.

Prompt delivery of high-quality care by public safety is critical as well, from rapid first responder defibrillation to good, uninterrupted chest compressions to state-of-the-art post-resuscitation care including initiation of cooling. This toolkit walks you through each link in the Chain of Survival providing you with practical efforts that your agency can take to assure the delivery of the best possible care.

Finally, SCAA recognizes that EMS personnel and First Responders toil daily in challenging and difficult situations and that EMS and FR agencies are often constrained by limited financial and personnel resources. We applaud your efforts and appreciate your challenges, which are often under-appreciated and unrecognized.

Vincent N Mosesso, Jr, MD SCAA Medical Director Professor of Emergency Medicine Quartersity of Pittsburgh School of Medicine nospite Care ncen





FACT SHEET: SUDDEN CARDIAC ARREST

• What is sudden cardiac arrest?

Sudden cardiac arrest (SCA) is a leading cause of death in the U.S., killing more than 325,000 people each year. That's more than the total death rate for breast cancer, lung cancer, and HIV/AIDS *combined*. During SCA, heart function ceases abruptly and without warning. When this occurs, the heart is no longer able to pump blood to the rest of the body, and in over 90% of victims, death occurs. This is usually caused when the electrical impulses in the affected heart become rapid (ventricular tachycardia, or "VT") or chaotic (ventricular fibrillation, or "VF"), or both. These **irregular heart rhythms are arrhythmias**. The general public and media often mistakenly refer to SCA as a "massive heart attack."

SCA is an electrical problem, whereby the arrhythmia prevents the heart from pumping blood to the brain and vital organs. There is an immediate cessation of the heart. In most cases, there are no warning signs or symptoms. A heart attack is a "plumbing" problem caused by one or more blockages in the heart's blood vessels, preventing proper flow, and the heart muscle dies. Symptoms include chest pain, radiating pain in left arm, between shoulder blades, and/or jaw, difficulty breathing, dizziness, nausea and vomiting, and sweating. In some cases, a heart attack may lead to a sudden cardiac arrest event.

Resuscitation from SCA

When someone collapses from SCA, immediate cardiopulmonary resuscitation (CPR) and use of an automated external defibrillator (AED) are essential for any chance of recovery. The AED analyzes the heart rhythm of the victim, and if necessary, a computerized command will instruct the user to press a button to deliver an appropriate shock to restore the normal operation of the heart. These devices are failsafe and will not cause injury to the user, nor will they deliver a shock if none is needed. For patients in "VF" (ventricular fibrillation), studies show that if early defibrillation is provided within the first minute, the odds are 90 percent that the victim's life can be saved. After that, the rate of survival drops ten percent with every minute. As many as 30 to 50 percent would likely survive if CPR and AEDs were used within five minutes of collapse.

Many heart failure patients who have either suffered an SCA or are at risk, have surgery to implant a small device called an implantable cardioverter defibrillator, or ICD. ICDs are designed to recognize certain types of arrhythmias and correct them with a shock. Ninety five percent of lethal ventricular arrhythmias were shown to be effectively terminated by ICDs.



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• Who is at risk for SCA?

SCA can strike persons of any age, gender, race, and even those who seem in good health, as evidenced by world class professional athletes at the peak of fitness. Many patients who may be at risk are not being identified, screened and given options for medical treatment. If someone has any of the following risk factors or symptoms, he/she should discuss with a doctor whether further heart testing and/or evaluation by an electrophysiologist (EP) or cardiologist is necessary:

- History of early heart disease, heart attack or cardiac death in the family
- Unexplained fainting or near fainting or palpitations
- Chest pain, shortness of breath or fainting with exertion (such as during sports)
- Heart failure or heart attack
- Weak heart muscle or a cardiac ejection fraction (EF) of less than 40% (EF refers to the percentage of blood that is pumped out of the heart's main pumping chamber during each heartbeat)
- Cardiac risk factors such as high blood pressure, diabetes, obesity, smoking, or high cholesterol

O Prevention

About 80 percent of SCA victims have signs of coronary heart disease. Leading a heart healthy lifestyle is important in preventing coronary artery disease and other heart conditions.

- Learn CPR and the use of an AED
- Activate 911 immediately in an emergency
- Help your community by advocating placement of AEDs in public places
- Know your personal and family health history that may identify risk factors



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FACT SHEET: Sudden Cardiac Arrest vs. Heart Attack

Same or Different?

SUDDEN CARDIAC ARREST

HEART ATTACK



- Sudden Cardiac Arrest (SCA) is a condition that occurs when the heart stops pumping blood. Usually, this is caused by an *electrical problem* in the heart.
- Occasionally, there is a mechanical problem where there may be a normal electrical signal; in turn the heart muscle fails to pump.
- Sometimes SCA is caused by severe hemorrhage and other issues.



- A heart attack is caused by a circulation or *plumbing problem* of the heart, when one (or more) of the arteries delivering blood to the heart is blocked. Oxygen in the blood cannot reach the heart muscle, and the heart muscle becomes damaged.
- This damage to the heart muscle can lead to disturbances of the heart's electrical system. A malfunction of the heart's electrical system may cause dangerously fast or slow heart rhythms that can cause SCA.
- Many SCAs occur in patients with coronary heart disease. If the patient suffers a heart attack, there is a higher risk for SCA.



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Importance of Bystander Assistance

The national survival rate for SCA is a low five percent because most cardiac events are not witnessed by others, or sadly, bystanders who are at the scene do not intervene and provide lifesaving assistance. Often times, bystanders enter a stage of shock, or out of irrational fear of contracting a medical condition or legal ramifications; they choose not to attend to the victim. Others simply don't know how to help. Either way, inactivity on the part of bystanders is deadly. Doing nothing should no longer be an option.

For every additional minute that passes while the victim is unattended, his/her chance of survival decreases by 10 percent. This number is sobering, as is the fact that most out-of-hospital cardiac arrest victims who survive are left with neurological deficits.

It's estimated that as many as 30 to 50 percent of SCA victims would likely survive if CPR and AEDs were used within five minutes of collapse. These numbers are encouraging, as is the number of states across the country re-writing their Good Samaritan laws to now provide civil immunity protection to lay individuals who perform CPR or use an AED.

Being a bystander and providing help is not something reserved only for medical professionals or first responders. Anyone can make a difference – whether a housewife, plumber, crossing guard, radio personality or bank teller. You never know when you will be placed in a situation where you can provide assistance. Learning CPR and how to use an AED is simple and easy, as many local organizations offer FREE courses as active community service projects.



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When to Call 9-1-1 & What to Expect When You Do

Dialing 9-1-1 is the first step we normally think of during a medical emergency, and rightfully so as it's been engrained in our upbringing since early childhood. It's all the more beneficial to the emergency dispatcher on the other end of the phone if you can provide basic details about the medical emergency and victim. So while dialing 9-1-1, here are some other extremely helpful and very important steps to take.

Tell the dispatcher the location. If you do not know street names, look around for street addresses on nearby buildings or other distinctive landmarks, and be as specific and detailed as possible.

Check the scene and safety around you. While we want to do the "right thing" and help a person in need, it's equally important to assess your immediate surroundings and stay out of danger. Little assistance can be given to a victim when the bystander's life is threatened.

Shake the victim and shout! It's possible that the individual may have simply "passed out" rather than suffered a heart attack or cardiac arrest. Shaking the person and making loud noises can sometimes bring them to consciousness. If the person does not respond, this information is very valuable to the dispatcher, who can immediately provide you with effective next-steps.

For more details on 9-1-1 and immediate first aid for cardiac emergencies, refer to the following Fact Sheet on CPR.



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FACT SHEET: Automated External Defibrillators (AEDs)

An automated external defibrillator (AED) is a portable device used to administer an electric shock to the heart and restore the heart's normal rhythm during sudden cardiac arrest. Ventricular Fibrillation (VF), the abnormal heart rhythm that most often leads to sudden cardiac arrest, is treatable. If the heart can be shocked quickly with an AED, a normal heart rhythm may be restored.

In the past, defibrillators were complicated and cumbersome. Only medical professionals with extensive training in heart rhythm interpretation could use them. Today, defibrillators used in public places and in the home are automated, portable and easy to use. They are no longer limited to emergency room and are now placed in airports, schools, offices, houses of worship, gyms, and most recently in homes. It is estimated that approximately 20 percent of all police cars carry AEDs to improve response times to assist SCA victims.

An AED consists of a small computer (microprocessor), electrical circuitry, and adhesive electrode pads. The electrodes collect information about the heart's rhythm. The microprocessor interprets the rhythm. If the heart is in ventricular fibrillation, the microprocessor recommends a defibrillating shock. The shock is delivered by way of the electrode pads, through the victim's chest wall, and into the heart. The shock stuns the heart momentarily, stopping all activity. This gives the heart a chance to restart normal electrical activity and resume beating effectively.

While AED and CPR training are available and recommended for those responsible for managing a public access to defibrillation (PAD) program, training is not required to use an AED. These machines have voice prompts to easily assist a novice at successfully using the device. It is important for bystanders who witness the collapse of an SCA victim to act quickly. If a person does not need the shock of an AED, the machine will not deliver a shock. It is not possible to hurt someone with an AED; they can only be used to save someone's life.

It is essential that defibrillation be administered immediately following the cardiac arrest. If the heart does not return to a regular rhythm within 5-7 minutes, this fibrillation could be fatal. If defibrillated within the first minute of collapse, the victim's chances for survival are close to 90 percent. For every minute that defibrillation is delayed, survival decreases by 7 percent to 10 percent. If it is delayed by more than 10 minutes, the chance of survival in adults is less than 5 percent.

Most AEDs are prescription devices and must be labeled with the prescription statement required by law (CFR 801.109), a physician who oversees the PAD program at a facility must write a prescription for most AEDs in order for the facility to purchase it. This is easily accomplished and there are many who are willing to help start a PAD program. In addition, one model of AED has been cleared by the FDA for over-the-counter sale and in-home use.



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FACT SHEET: Cardiopulmonary Resuscitation (CPR)

Cardiopulmonary resuscitation, or CPR, is a method of providing oxygen and blood circulation through rescue breathing and chest compressions. During cardiac arrest, the normal rhythm of the heart is interrupted and the heart muscle loses its ability to pump blood (and distribute oxygen through the blood).

The potential loss of oxygen impacts the entire circulatory system, affecting the brain and other vital organs. Delivery of CPR is LIFE-SAVING first aid, and can increase a person's chances of survival if started within minutes of a sudden cardiac arrest event by helping to maintain vital blood flow to the heart and brain. Without oxygenrich blood, permanent brain damage or death can occur in less than 8 minutes. Moreover, CPR has been shown to increase the amount of time that an electric shock from a defibrillator can be effective. In fact, the American Heart Association estimates that effective bystander CPR, provided immediately after sudden cardiac arrest, can double or triple a person's chance of survival.

CPR should be performed when a person is not showing signs of life. Victims will be unconscious, unresponsive, not breathing normally, and not moving. Taking immediate action can help save a life when a potential rescuer follows this emergency sequence:

- PHONE FIRST: Dial 9-1-1 immediately, or send someone to make the call if a phone is not immediately available. Tell the dispatcher the specific location and what action is being taken. DO NOT HANG UP!
- SCENE SAFETY: Make sure that you are not in immediate danger as well.
- UNIVERSAL PRECAUTIONS: If gloves and mouth barrier are available, prepare yourself to use them accordingly.
- SHAKE AND SHOUT: Determine unresponsiveness of the victim. "Hey, are you OK?!"
- **CLEAR AIRWAY:** Tilt the head and lift the chin to open the airway.
- COMPRESSIONS: Place the heel of one hand over the other, position yourself with shoulders directly over the victim and deliver compressions to the center of the chest (along the line of the nipples). The most effective rate is 100 compressions per minute. Push hard, push fast, and allow for full chest recoil between compressions.



The Chain of Survival: What is it?

As awareness of sudden cardiac arrest continues to be spread, there are several integral factors which contribute to the survival of these events. *Taking early action is lifesaving.*



U Provention & Prongradus

Prevention & Preparedness

Witnessing an emergency event, making an immediate assessment of the situation, and deciding to act.

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Early Recognition & Activation of 9-1-1

Confirming unresponsiveness and calling 9-1-1 or on-site emergency responders and following the instructions of the emergency dispatcher.

3 Early CPR

Beginning cardio-pulmonary resuscitation (CPR) immediately.

4

5

Early Defibrillation

Immediately retrieving and using an automated external defibrillator (AED) to restore the heart back into normal rhythm.

Early Advanced Life Support

Emergency medical services (EMS) responders begin immediate advanced life support including additional resuscitative measures and/or other therapies.

6

Post Cardiac Arrest Care

Seeking and receiving effective follow-up care after a sudden cardiac arrest.

Rehabilitation and Recovery

Providing patients with access to care in the form of medical, physical and mental support programs that address recovery challenges associated with surviving cardiac arrest.

Sudden Cardiac Arrest Facts

Did you know...

- Sudden cardiac arrest (SCA) is the leading cause of death in the United States, claiming approximately 300,000 lives each year (about 1,000 people a day).
- SCA victims usually collapse suddenly, without warning, and become unconscious. SCA leads to death if it is not treated immediately.
- SCA is not the same as a heart attack. Heart attack victims usually experience chest pain and are conscious.
- On average, only six percent of sudden cardiac arrest victims in the United States survive. But in some settings, survival rates of 20 percent have been achieved. If the chain of survival were properly implemented in our communities, more than 68,000 additional lives could be saved each year.
- The rationale for widespread deployment of automated external defibrillators (AEDs) is this: electrical therapy must be delivered immediately (ideally within five minutes of collapse) for it to be effective. Even the best emergency medical services (EMS) systems do not usually get to the scene this quickly.
- Victims of sudden cardiac arrest who collapse in public places are more likely than those who collapse at home to receive CPR and defibrillation, and to survive.
- Learning to use an AED is simple and intuitive. Formal training can take place in less than one hour, and even untrained bystanders have been able to use AEDs successfully in actual emergencies.
- The median age for victims of sudden cardiac arrest is 65, but many victims are much younger. Even children and teens have become victims, with the Heart Rhythm Society estimating that 5,000 7,000 youth in the U.S. die from SCA each year.
- Many AEDs now cost less then \$1,500.
- Nearly one million Americans now have implantable cardioverter defibrillators (ICDs) which provide 24/7 protection and therapy for patients with high risk of SCA.



Why Should First Responders Work To Increase Awareness Of SCA?

First responders are uniquely positioned in local communities to improve the links of the "chain of survival," and raising awareness of SCA is an all-around win for first responders. Too often, first responders go unnoticed by the public, even during medical emergencies during which they are the first line of defense.

This program will enhance the image of first responders as leaders in emergency care. It puts a face on the profession of emergency responders and shines light on the invaluable role of responders in maintaining public health and safety. Ultimately, this program's goal is to increase survival rates of SCA, yet that alone is not the only positive result. Relationships with first responder agencies and various community groups will become stronger and greater recognition will be paid to the importance of bystander intervention and first responders through public events honoring their lifesaving and heroic acts.



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What's Your Community's IQ When It Comes To SCA?

Most people do not know what SCA is, how it differs from a "heart attack," and how to respond to it. It's not surprising then that most people aren't aware the threat of SCA exists within their own homes and communities.

Before reaching out to educate residents about the public health crisis of SCA, it's helpful to identify and measure data within your community. In other words, find out how informed or equipped your community is about SCA. Addressing the following questions can provide you with a solid starting point to develop productive and effective community outreach efforts:

- Are there AEDs located throughout your community? Identify the number of AEDs and where they are located.
- How many cases of out-of-hospital cardiac arrest have occurred in your community? Of those, how many resulted in survivors?
- Do schools and athletic organizations have emergency action plans addressing SCA?
- \Im Is SCA a focus of health classes?
- How many local residents are trained in CPR/AED use?
- Are there other local organizations that educate residents about SCA?



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SCA PREVENTION PROGRAMS (listed by increasing complexity)

1. Work with local clinics to distribute pamphlets on differences between heart attack and SCA/ Know Your Ejection Fraction (EF) in waiting rooms of heart hospitals, and cardiology, family practice, ob-gyn clinics.

2. Get hospital permission to enclose SCAA and SCA pamphlets in ICD implantees' materials when they leave the hospital.

3. Translate ICD, drug therapy, healthy heart, "EF", heart screening, and other prevention materials into non-English languages as required to reach all citizens in your community. Use local college/university resources and/or native language people to keep costs down.

4. Collaborate with your local Electrophysiologists or talk to cardiologists and primary care physicians/nurses/assistants about the ACC/AHA primary prevention guidelines.

5. Exhibit at community fairs/health fairs to distribute ICD, drug therapy, healthy heart, "EF", heart screening, and other prevention materials and host an SCAA chapter booth/table to enroll survivors, people living with devices, and others.

6. Sponsor a speaker at Patient Support Groups sponsored by the cardiology clinics about living with a device.

7. Develop a community health fair highlighting safe heart/preventative information, featuring Ejection Fraction (EF) and need for SCA risk assessment. Identify and sponsor a local electrophysiologist or other heart specialist to speak to community groups including Rotary Clubs, places of worship, medical societies, etc.

8. Become a patient ambassador to your local cardiology clinic to have pre-implanted patients referred to your SCAA local chapter members. Join with local Mended Hearts volunteers for peer-to-peer support.

9. Set up Patient Support Groups in your local hospital/cardiology clinic for survivors and patients. Talk to local hospitals about distributing patient support group kit.

10. Get a local talk radio program to dedicate a show to "living with an ICD" with a physician/expert and an implanted patient.



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In April 2008, the American Heart Association revised its recommendations and encouraged lay bystanders to use compressiononly CPR as an alternative to the combined rescue breathing and chest compression method. Research had shown that many people were reluctant to provide CPR support because of their personal discomfort in providing mouth-to-mouth breathing to a stranger. The compression-only method provides vital blood flow and oxygen support while waiting for emergency responders or the shock of a defibrillator to be administered, and overcomes an important hurdle in getting everyone to act when someone suffers sudden cardiac arrest. New technology has been also developed to assess the efficacy of CPR technique. This new line of devices can help rescuers provide proper pace and depth of compressions, while giving automated voice prompts for breaths.



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FACT SHEET: Diagnostic Testing for Patients at Risk for SCA

A doctor, generally a cardiologist or electrophysiologist, may conduct a series of tests to diagnose patients and determine risk level, treatment options, and indications for implantable cardioverter device (ICD) therapy. These include:

- Electrocardiogram
- Echocardiogram
- Holter Monitor
- Event Recorder
- Electrophysiology Study (EPS)
- Cardiac catheterization
- T-wave alternans (TWA) Test

An **Electrocardiogram**, often called an EKG, is a painless and common test that records the electrical activity of the heart. It produces lines called "waveforms" that a clinician may view on a monitor or print on paper. When divided into time segments, these waveforms are used to measure the rate of movement of the heart's electrical impulses.

An **Echocardiogram** is a non-invasive, safe and effective test to study the anatomy of the heart. It uses sound waves (ultrasound) to form images of the structures of the heart. An "echo" is used to evaluate the size of the different chambers of the heart, the quality of the valves, measure the heart's pumping ability and identify other problems of the heart that may increase a person's risk for dangerous arrhythmias.

Holter Monitor is a portable heart monitor that is worn by patients to monitor heart rhythms over a period of time. Patients wear a small recording box attached to their chest by five adhesive electrode patches for 24-48 hours.

An **Event Recorder** is a portable heart monitor that is worn by patients to monitor heart rhythms over a period of time. When patients experience symptoms, they activate the event record to take a snapshot of their heart's activity as they are symptomatic. This is useful for patients with relatively infrequent and brief symptoms.

During an **Electrophysiology Study**, an electrophysiologist specifically provokes arrhythmia events in the patient in a controlled clinical environment. During the study, data about the flow of electricity during actual events is collected. As a result, EP studies can help locate the specific areas heart tissue that give rise to the abnormal electrical impulses that cause arrhythmias. This detailed electrical flow information provides valuable diagnostic and, therefore, treatment information.

A **T-wave alternans (TWA) test** is used to detect a subtle electrical abnormality in the EKG that is linked to increased risk of dangerous arrhythmias. It is a non-invasive test that requires the patient to wear electrodes on the torso while walking for 5-7 minutes on a treadmill to elevate the heart rate.



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Successful Screening Programs Across the Country

Chicago, Illinois. Under the guidance of Dr. Joseph Marek, clinical cardiologist with Midwest Heart Specialists, the Midwest Heart Foundation is working to increase awareness of sudden cardiac death in young adults. The Young Hearts for Life® Cardiac Screening Program brings qualified medical volunteers to high schools to provide free electrocardiograms (ECGs) to identify high school students at risk for sudden cardiac death. Since 2006, Midwest Heart Foundation in collaboration with high schools, community hospitals and volunteers has provided free ECG screenings to over 62,000 high school students. Marek's research team gave ECGs to 50,665 teens, 14 to 18 years old, including athletes and non-athletes. The screening was done in 32 schools in suburban Chicago during the regular school day. Screening identified 1,096 teens with abnormal ECGs, indicating a heart irregularity that could result in sudden cardiac death. Of those teens, 150 were found to have left ventricular hypertrophy, which can lead to hypertrophic cardiomyopathy, the most common cause of sudden cardiac death. Another 145 had a condition called prolonged QTc, which could indicate long QT syndrome, also linked to sudden cardiac death.

Seattle, Washington. Free advanced heart screenings for high school students and student athletes are being offered throughout the greater Seattle area. Approximately one high school undergoes screening every two months with nearly 400 students at each screening session. The University of Washington cardiology and sports medicine departments, as well as Seattle Children's Hospital, members of the Nick of Time foundation, local EMS/fire and other physicians have been working together in this broad-based collaborative effort.

Houston, Texas. The Houston Early-Age Risk Testing and Screening (HEARTS) program will provide cardiovascular screening to 1,500 sixth-grade students at HISD's Luther Burbank, Lamar Fleming, James Hogg, Francis Scott Key, and Jane Long Middle Schools. Trained and licensed healthcare workers from the University of Texas Medical School at Houston Division of Cardiology and the Memorial Hermann Sports Medicine Institute will administer a cardiac physical examination, an electrocardiogram (EKG), and a echocardiogram (2-D echo). Students receive a free physical examination and specialized cardiac examinations and any follow-up that's needed at no cost to students and families.

Also in Houston, the Houston Independent School District and the Center for Coronary Artery Anomalies at the Texas Heart Institute are partnering to provide voluntary screenings for students at various middle schools. With parental permission, each student is screened using both the MRI and ECG equipment in a non-invasive process that typically lasts 15 minutes and is at no cost to parents. The project is being underwritten by a \$5 million donation by the local Kinder Foundation.



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Sudden Cardiac Arrest in Athletes: Debunking the Myth from Media Hype

Christine Lawless, MD, MBA, FACC, FACSM, CAQSM is president of Sports Cardiology Consultants in Chicago, Illinois. A highly regarded expert on SCA and athletics, she also serves as team physician for US Figure Skating, consulting cardiologist to Major League Soccer and co-chair of the American College of Cardiology Council on Sports and Exercise Cardiology. After numerous media documentations of recent SCA incidents in student athletes, SCAA sat down with Dr. Lawless (a member of the SCAA Medical Advisory Board) to find out the truth behind this topic and dispel any misleading information. Here's what we learned:

Athletes represent fitness and vitality. Thus, when sudden cardiac arrest (SCA) occurs in an athlete, it may be shocking and counterintuitive to what we believe about athletes. Repeated media reports of each individual death makes us think that these episodes occur more frequently than they actually do.

The true frequency of SCA in athletes is not known, as there is no mandatory scientific registry of such events. Some research indicates that the risk of an event in the USA is about 1/200,000 athletes per year; whereas other reports suggest this may be 4-5 times higher, about 1/40,000 athletes/year. Athletes who appear to be at particular risk are football and basketball athletes in the USA, soccer players in Europe, and endurance athletes such as triathletes.

Because of differing causes of underlying heart disease, athletes are generally divided into those under the age of 35-40 years old, and those over the age of 35-40 years. SCA episodes in athletes under the age of 35-40 years are likely to be due to inherited heart muscle disease (hypertrophic cardiomyopathy), a direct blow to the chest (commotio cordis), abnormal position of the coronary arteries (anomalous coronary artery), dilated aorta with valvular disease (Marfans syndrome), or primary disorders of cardiac rhythm (channelopathies like long QT). Although the majority of the SCA episodes in athletes are due to underlying cardiac disease, there are other causes of sudden death in athletes, such as sickle cell disease, and heat illness. In athletes over the age of 35-40 years, SCA episodes are far more likely to be due to blockage in the arteries to the heart (coronary artery disease).

Strategies to prevent SCA episodes in athletes are aimed at two levels. The first is to detect underlying heart disease during pre-participation screening examinations; the second is to treat episodes of SCA as quickly as possible on the athletic field, or in athletic venues.

A variety of primary care healthcare providers perform initial pre-participation screening for heart disease during pre-participation examinations (PPE). If a cardiac issue is identified, the athlete is referred to a cardiologist for a participation recommendation. The American College of Cardiology (ACC) and the American Heart Association (AHA) have published a set of expert recommendations called the 36th



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Bethesda Guidelines. These guidelines provide a framework for cardiologists to make wise participation and return-to-play decisions in athletes.

In Europe, it is routine to include the 12 lead electrocardiogram (ECG) in preparticipation examinations. Data generated in Italy suggests that the ECG may enhance the ability to detect underlying heart disease, and ultimately lower the SCA and sudden death rates. However, data from Israel suggests that the addition of the ECG does not reduce the incidence of SCA episodes and sudden death rate. At present, the AHA does NOT recommend inclusion of the ECG in pre-participation examinations for athletes in this country. No doubt, this issue will continue to be researched over the next few years to determine if enhanced cardiac screening would be useful in the U.S. to prevent SCA and sudden death episodes.

Recent data suggests that the ECG can improve the sensitivity of the preparticipation examination from 35 or 40 percent to as high as 85-90 percent in detecting underlying heart disease, especially hypertrophic cardiomyopathy.

Critics of ECG screening are opposed for several reasons. Because the incidence of SCA is so low in athletes, addition of ECGs may not have any impact on the incidence of SCA or sudden death when studied in a carefully performed randomized trial. The U.S. has an already low incidence of SCA in athletes, perhaps as low as what Italian researchers ended with after over 20 years of ECG-based screening. Thus, it may not be possible to improve upon this figure. Athletic adaptation can cause changes on the ECG that are difficult to distinguish from pathology, so there is a substantial chance of physicians misinterpreting the ECG. This can result in athletes being disqualified who actually have no underlying disease (false positives). This false positive rate should not be underestimated, as studies have shown it can be as high as 40 percent. The additional resources required to "work up" false positive ECGs may be cost prohibitive, and may result in undue risk to the athlete.

Despite well-meaning screening attempts, no pre-participation strategy is fail-safe, and there is always the possibility of an SCA episode in athletic individuals. If an SCA episode occurs, one must be prepared to treat it quickly with an AED. These machines should be available at all athletic venues to assure that episodes of SCA can be dealt with promptly, thus allowing the opportunity for maximal survival from an event. Although we have limited data in athletes, the success rate of defibrillation with AEDs ranges somewhere between 25-75%, depending on age of athlete, athletic venue, and group studied.

Although the frequency of SCA episodes in athletes is probably quite low, diligent preparticipation screening for underlying cardiac disease, prompt attention to cardiac symptoms, evaluation by cardiologists, and rapid recognition and treatment of an SCA episode with an AED can reduce the likelihood of athlete mortality from such events.



Sudden Cardiac Arrest Association



CPR & AED Training in Schools Program

Through our collaborative efforts, SCAA and its chapters have reached thousands of students, teachers, parents, coaches and athletic directors to raise awareness of SCA, the importance of giving CPR and using AEDs to save lives. Our goal is to change the paradigm of unnecessary deaths from SCA by educating and empowering bystanders to act during an emergency situation.

In 2010, SCAA launched its CPR and AED Training Program "Keep it Beating" for high school students. The program is 90 minutes long and consists of two 45-minute classes. Part I teaches the difference between SCA and a heart attack, what an AED is and the importance of a heart-healthy lifestyle. Part II teaches adult/child CPR, use of an AED and adult/child choking rescue.







Emergency Action Plan (EAP)

Schools are an important gathering place for students, staff and visitors within the community. Providing a safe environment for all who congregate on a school campus is a priority! Part of promoting a safe environment is having an effective Emergency Action Plan in place. The goal is to give victims of SCA or other life-threatening emergencies a chance to survive by immediately implementing a consistent response protocol that includes:

- Early activation of the EMS by calling 9-1-1
- Early CPR
- Early defibrillation
- Early transition to EMS

Many schools have an athletic trainer who is able to provide medical assistance during after-school events. However, the availability of the trainer is limited because several sports occur simultaneously. Just one trainer cannot be in several places at one time, and therefore emergency response training is critical for coaches, students, event staff, nurses and other administrators.

Follow these steps to create an EAP:

- Conduct an AED Site Assessment
- Develop a Communication/Crisis Plan
- Create specific entries for Fall sports, Winter sports and Spring sports, and do not forget to cover Fine Arts events, as well.

For coaches and advisors:

- Develop a response protocol worksheet and include a site map for each member of team
- Discuss this plan with the team and identify student responders who can also be of assistance
- Seek input from other staff while developing the document, and always keep an original copy of the plan/document on file in the office
- Take the plan to each practice/game/event





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SURVEY FOR AED NEED

Following is a partial listing of sites in many communities that may have AEDs or could be potential sites for AEDs. Please IDENTIFY those that are in your area and community:

		AEDS			
SITE	LOCATION (City or Zip Code)	In Place	Great Need	Future Need	Need Training
First Responder Unit (not ambulances)					
County Sheriff Vehicles					
Fire Department Vehicles					
Police Vehicles					
Schools					
Faith-based Organizations					
Local Businesses/Shopping Malls					
Public/Government Facilities					
Health Clinics /Physician/Dentist offices					
Hospitals					
Nursing Homes					
Assisted Living Facilities	÷				
Community Centers/YMCA/YWCA					
Movie Theaters					
Private Fitness Centers					
Motels/Hotels/Resorts					
Marinas	A E				
Golf Courses					
Restaurants / Bars					
Grocery Stores					
Community Gathering Places (Parks, pools, ski areas, other)					
Other:	<u> </u>				



Resuscitation Programs (listed by increasing complexity)

1. Complete a survey of the number of AEDs in your community. You may want to target specific types of public facilities. Examples could be houses of worship, health clubs, golf and tennis clubs, hotels, government buildings, shopping malls, etc. Develop a census from the information gathered. Submit an article to local newspapers/community newsletters detailing the results.

2. Distribute SCAA brochures and other AED Fact Sheets to community centers, libraries, schools, physician offices or grocery stores and other public places.

3. Translate AED materials into non-English languages as required to reach all citizens in your community. Use local college/university resources and/or native language people to keep costs down.

4. Exhibit at community fairs/health fairs to distribute materials and host an SCAA chapter booth/table to enroll survivors, recruit new members and educate the community.

5. Collaborate with existing community health centers to provide assistance/instruction of CPR Training.

6. Contact local high schools to find out about community service volunteer requirements. Find students who may be interested in spending community volunteer time to work with local chapter on AED programs.

7. Use step by step Public Access to Defibrillators (PAD) Process to place permanent AEDs in specific types of public facilities. Again, these may be schools, businesses, places of worship, airports, grocery stores or fitness centers. Ensure training on the use of the AED.

8. Partner with a hospital, local college or university to sponsor a Healthy Heart forum focusing on SCA awareness.

9. Submit an article to community newspapers and community newsletters detailing the statistical and survival need for placing AEDs.

10. Organize athletes screening event at schools, health fairs.

11. Work to equip local police department vehicles with AEDs. EMS 10-step program to place AEDs with first responders.

12. Contact a local talk show host or local news media outlet to have a program or segment on chapter activities. Offer interviews with chapter leadership and with survivors resuscitated with CPR/AED.

13. If already in place in your state, work with your state Department of Public Health and the American Heart Association towards achieving a "HeartSafe Community" status.

14. Change the state laws to require AEDs in schools, health clubs or other public facilities, working with local and/or state legislators/Department of Public Health.





Public Access to Defibrillation (PAD)

Numerous scientific studies conducted during the past two decades have proven that rapid defibrillation is the single most important factor affecting survival from Sudden Cardiac Arrest in adults. This research, coupled with important technological advances, has driven an international movement to increase access to early defibrillation.

In order to have AEDs available more quickly for persons who need them, some facilities (such as hotels, airports, country clubs, schools etc.) are purchasing these devices under what is called a Public Access Defibrillation (PAD) program. Since AEDs are prescription devices and must be labeled with the prescription statement required by law (CFR 801.109), a physician who oversees the PAD program at a facility must write a prescription for most AEDs in order for the facility to purchase it. This is easily accomplished and there are many who are willing to help you start a PAD program. To date, one model of AED has been cleared for the FDA for over-the-counter sale and in-home use.

Public Access refers to accessibility for trained users to use AEDs in public places. While AEDs are now very simple to use and many untrained laypersons have used them successfully, it is best to assure that trained personnel are always on site (at locations where this is feasible). A trained user does not necessarily mean trained medical personal but also refers to laypersons with AED training.



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How to Set Up an AED Program

The Sudden Cardiac Arrest Association is committed to broadening public access to defibrillation. Numerous scientific studies conducted during the past two decades have proven that rapid defibrillation is the single most important factor affecting survival from sudden cardiac arrest in adults. This research, coupled with important technological advances, has driven an international movement to increase access to early defibrillation. In this section, SCAA highlights important information for identifying your community's needs and implementing a successful community AED program.

This information can also be helpful for businesses, schools, service organizations and others seeking to establish AED placement and CPR/AED training programs in schools, sports centers, office buildings, shopping centers, residential communities and other venues.

On-Site AED Programs

Even if a community has done everything possible to strengthen its chain of survival, the success of a community defibrillation program can be limited. For example, if you live in rural area and EMS has long distances to cover, or an urban area, where EMS has to contend with traffic and high-rise buildings, the time to first shock may be delayed. This is why many locations – such as airports, office complexes, residential communities, shopping centers, sports stadiums and schools – have established on-site defibrillation programs to place AEDs and to train staff and volunteers in CPR and AED use.

When sudden cardiac arrest occurs outside the hospital, it occurs most often in the home. For this reason, some families of at-risk individuals have elected to place AEDs in their homes and to be trained in CPR and AED use. As research continues in this area and AEDs become more readily available for home use, it is possible that home placement of AEDs will increase significantly.

Determine The Need

Saving lives takes a team effort. And, it takes consideration of a number of factors that will help determine the type of AED program your community needs, including the size and location of your community - large city, small suburb, and rural community. Evaluation of the current emergency response system is important to assess how prepared your community currently is to handle sudden cardiac arrest. Checking with your local government is also important as laws and requirements vary. Once you determine your community's needs, then you can identify areas for improvement: greater public awareness, more public and professional training, wider placement of AEDs.



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Based on the chain of survival approach, the following questions can help your community assess areas of focus and need:

Early Access

- Does your community have Enhanced 9-1-1 coverage?
- Does the public know how to recognize a cardiac emergency?
- Does the public know to call 9-1-1 (or the local emergency number) immediately in the event of an apparent cardiac emergency

Early CPR

- Are emergency dispatchers trained to give callers instructions in CPR?
- Is most of the teen and adult population trained in CPR?

Emergency Defibrillation

- Do state laws and regulations permit first-arriving emergency personnel and trained laypersons to use defibrillators?
- Are all first-responding emergency personnel equipped with defibrillators?
- Are these personnel trained to deliver the first shock within 60 seconds of their arrival (if response time is greater than five minutes)?
- Is the average "call-to shock" time five minutes or less in at least 90 percent of cases?

Early Advanced Care

• Does your community have paramedics or emergency physicians prepared to provide early advanced care?

If you can answer "yes" to each of these questions, the chances for SCA survival in your community are strong. If any answer is "no", the chances for SCA survival are greatly diminished.

Key Community Program Components

Once you have identified your community's needs, developing an on-site Public Access Defibrillation program involves consideration of four major components -personnel, equipment, emergency response plan, and ongoing quality improvement. The following check list provides essential elements to consider for your program.





Personnel

- 1. Identify program coordinator.
- 2. Identify a group of responders and train in CPR and AED use.
- 3. Enlist a medical consultant (consider local EMS).

Equipment

- 1. Select AED appropriate for venue amd users.
- 2. Determine most accessible location for 24 hour availability.
- 3. Check AED present and in "ready" mode daily.
- 4. Replace pads and batteries as needed (expire about every two years).

Response Plan

1. Develop an emergency response plan (ERP) including activation of on-site responders and call to 911.

2. Assure occupant awareness of ERP and AED location(s).

Quality Improvement

- 1. Assure compliance with local legal requirements
- 2. Review plan annually and consider drills

Download, read, print, and distribute the 10 Step Community AED Program Guide from the SCAA website to begin your community AED program today.

Legislative Initiatives

The Sudden Cardiac Arrest Association (SCAA) is deeply committed to preventing loss of life due to sudden cardiac arrest. For this reason, SCAA has taken a leadership role and joined forces with other professional and patient organizations that share this commitment and have unified to form the *Sudden Cardiac Arrest (SCA) Coalition*. By leveraging the passion and resources from its member organizations, the SCA Coalition aims to prevent sudden cardiac arrest deaths through legislative initiatives that lead to greater public awareness, research and access to life-saving therapies.

- State Laws on Heart Attacks (provided by the National Conference on State Legislatures) (February 2008 update)
- State Laws on Automated External Defibrillators (provided by the Centers for Disease Control and Prevention)
- Josh Miller Helping Everyone Access Responsive Treatment in Schools (HEARTS) Act of 2007
- Cardiac Arrest Survival Act (Public Health Improvement Act of 2002)
- Community Access to Emergency Devices Act
 (Public Health Security and Bioterrorism Preparedness and Response Act of 2002)





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Successful Programs

Many communities around the United States are actively engaged in improving survival from sudden cardiac arrest. Examples of some of the successful efforts include the following:

- Rochester
- Maine Cardiovascular Health Program
- Nashville Public Access Defibrilation Program
- San Diego Project Heart Beat Public Access Defibrillation Program

ADDITIONAL AED RESOURCE LINKS

ABCs of AEDs

http://www.nirsa.info/know/2007/08/risk001.html AEDs at Camp http://findarticles.com/p/articles/mi m1249/is 2 79/ai n16133379 AEDs: Life-saving Technology is Only Part of the Story http://findarticles.com/p/articles/mi_ga3922/is_200212/ai n9150907/pg 1 American Hearth Association Policy Recommendations on Community Lay AED Programs http://circ.ahajournals.org/cgi/reprint/CIRCULATIONAHA.106.172289v1 Federal Occupational Health Guide to AEDs http://www.foh.dhhs.gov/Public/WhatWeDo/AED/AED.asp **Recent Changes in CPR** Follow these links http://www.nirsa.info/know/2008/04/risk001.html from the SCAA Occupational Health and Safety: Assessing Your Needs website for more http://www.ohsonline.com/articles/44642/ info! Occupational Health and Safety: It's a Matter of Time http://www.ohsonline.com/articles/44626/ Occupational Health & Safety Administration (OSHA) Guidelines on AEDs http://www.osha.gov/SLTC/aed/solutions.html Occupational Health & Safety Administration (OSHA) Statement on AEDs in the Workplace http://www.osha.gov/SLTC/aed/recognition.html Sample Policy and Procedures Statement for AED Programs http://policy.iastate.edu/policy/defibrillator/

http://www.northwestern.edu/risk/defib.htm

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27



Early Advanced Care/Early EMS Care

Prompt and expert care by advanced EMS providers is another important link in the Chain of Survival. Some things you can do to assure your citizens are getting the best possible cardiac arrest care are:

Optimize EMS Dispatch

Make sure your dispatch center is using an effective emergency medical dispatch system so that possible cardiac arrest and other critical calls are dispatched first and that closest first responder and ALS units are both dispatched. Review call received to dispatch times. Review call-taker prioritization.

Optimize System Efficiency

Assure that ALS units are scheduled and deployed to most efficiently cover high priority calls with reasonable response times. Monitor mean and 90% fractile response intervals.

Protocols

Engage your medical director to assure your system is using state of the art protocols for treatment of cardiac arrest in line with the latest American Heart Association CPR and ECC Guidelines as well as the latest prehospital care and resuscitation science.

Education and Training

Promote state of the art care by continuing education on the latest concepts in cardiac arrest care, including the importance of high-quality chest compressions with minimal interruptions. Consider running crews through simulation drills to develop efficiency with care delivery and teamwork.

Quality Improvement and Feedback

See separate section in toolkit.



Cardiac Arrest Association



ABOUT THE SUDDEN CARDIAC ARREST ASSOCIATION (SCAA)

The Sudden Cardiac Arrest Association (SCAA) is the nation's largest nonprofit advocacy organization exclusively focused on sudden cardiac arrest awareness and prevention. SCAA was founded and incorporated in 2005, an outgrowth of the pioneering work done by the National Center for Early Defibrillation (NCED), a unit of the Department of Emergency Medicine at the University of Pittsburgh.

Our members are SCA survivors, patients at risk, medical professionals, emergency responders and others touched by SCA. In addition to our platform of national programs and initiatives, SCAA's growing network of nearly 50 chapters and affiliates from across the country coordinate a number of educational campaigns throughout the year – from ceremonies honoring emergency responders to public speaking engagements, fundraisers and local and state policy development, such as Public Access Defibrillation (PAD) programs, Good Samaritan liability protection and CPR requirements for high school graduation.

To further increase awareness of SCA and cardiovascular health issues among policymakers, SCA is a member organization of several "like minded" patient advocacy groups, including the Partnership to Improve Patient Care (PIPC), Partnership to Fight (PFCD) Chronic Disease, SCA Coalition and the Patient Advocate Foundation and has developed relationships with more than two dozen leading medical centers.

While SCA is a significant public health crisis, it is often misunderstood. SCA is not a heart attack. A heart attack occurs when a blood vessel becomes blocked and interrupts blood flow to the heart, causing heart muscle to die. Sudden cardiac arrest occurs when the heart's electrical system malfunctions and the heart stops beating. Most of these deaths occur with little or no warning, from a syndrome called sudden cardiac arrest. The most common cause of sudden cardiac arrest is a disturbance in the heart rhythm called ventricular fibrillation.

Simply put, we want people to know what SCA is and improve emergency response and resuscitation methods to increase survivability of SCA. We seek to educate Americans on the risk factors that relate to their personal health, the benefits of seeking preventive care and leading heart-healthy lifestyles.

SCAA is a 501(c)3 nonprofit tax exempt organization recognized under the Internal Revenue Code. SCAA has 52 chapters nationwide.



Sudden Cardiac Arrest Association



SCAA Advocates

SCAA works toward establishing a nationwide response to cardiac arrest, in which communities are better prepared and bystanders are trained to offer assistance in cardiac emergencies. To expand the number of publicly accessible AEDs, we support federal and state legislation that require the devices in schools and other public places.

SCAA Partners

To increase the number of bystanders, SCAA works with state governments to revamp Good Samaritan laws to include protection of bystanders using AEDs.

And in promoting local ordinances, we join forces with EMS agencies, police and fire departments across the country to recognize the life-saving efforts of emergency responders and dedication of survivors.

Additional Resources for the Rehabilitation & Recovery Process

Beyond these core pillars, SCAA's focus on the physical, mental and emotional aspects of complete SCA recovery continues to expand as we:

- link survivors living with ICDs to ongoing nationwide research studies
- provide patients access with medical professionals including mental health specialists
- share overall heart-healthy lifestyle guidance

SCAA is the nation's leading nonprofit advocacy organization exclusively dedicated to SCA awareness, and prevention to create safer communities that are better prepared to respond to cardiovascular emergencies and increase survival from SCA. Visit <u>www.suddencardiacarrest.org</u> to learn more.

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