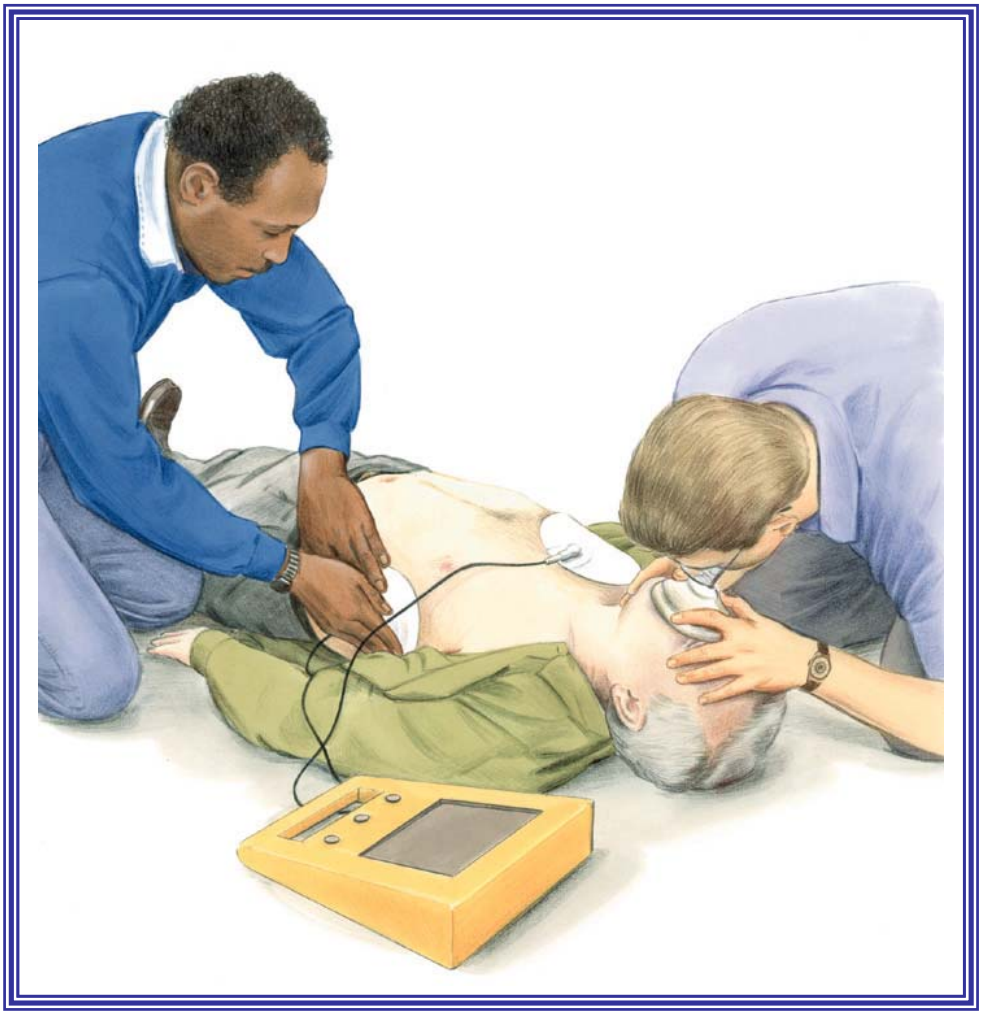
AEDs in the School



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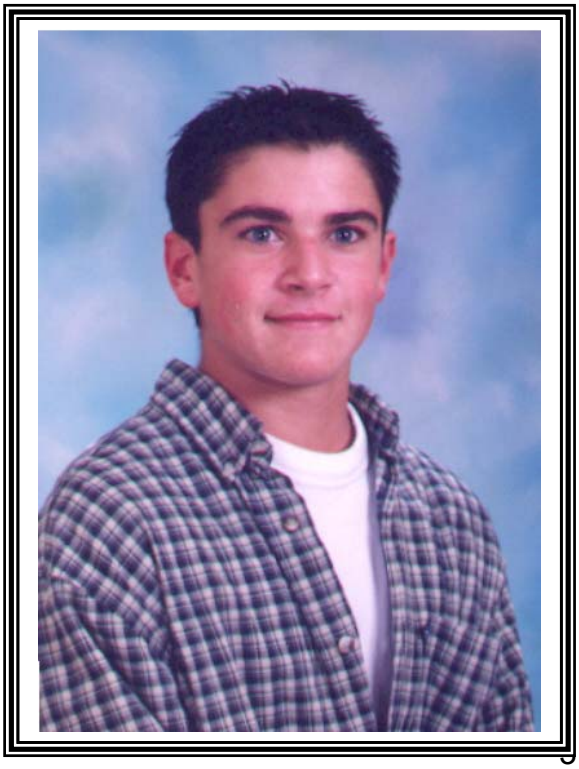
The Story of Louis J. Acompora

Louis Acompora, a 14-year-old boy, died on March 25, 2000 from a condition known as **Commotio Cordis** while playing Lacrosse. Louis, a goalie who loved the game of Lacrosse, blocked a routine shot with his body that resulted in a Lacrosse ball striking his chest directly over his heart. In a millisecond his heart was thrown into a lethal abnormal heart rhythm called "**ventricular fibrillation" or VF**. VF causes a useless quivering of the heart that results in a complete cessation of circulation. Instantly, his brain and other vital organs were without circulation and oxygen. Within a few seconds he collapsed to the ground. Most observers initially suspected that he was recovering from the discomfort of the blow. To the shock of the coach, bystanders and his parents, Louis was unconscious, not breathing and had no pulse. Rescuers at the scene administered Cardiopulmonary Resuscitation (CPR). However, defibrillation was not administered for well over 12 minutes following the collapse. Attempts at resuscitation were futile and Louis died.



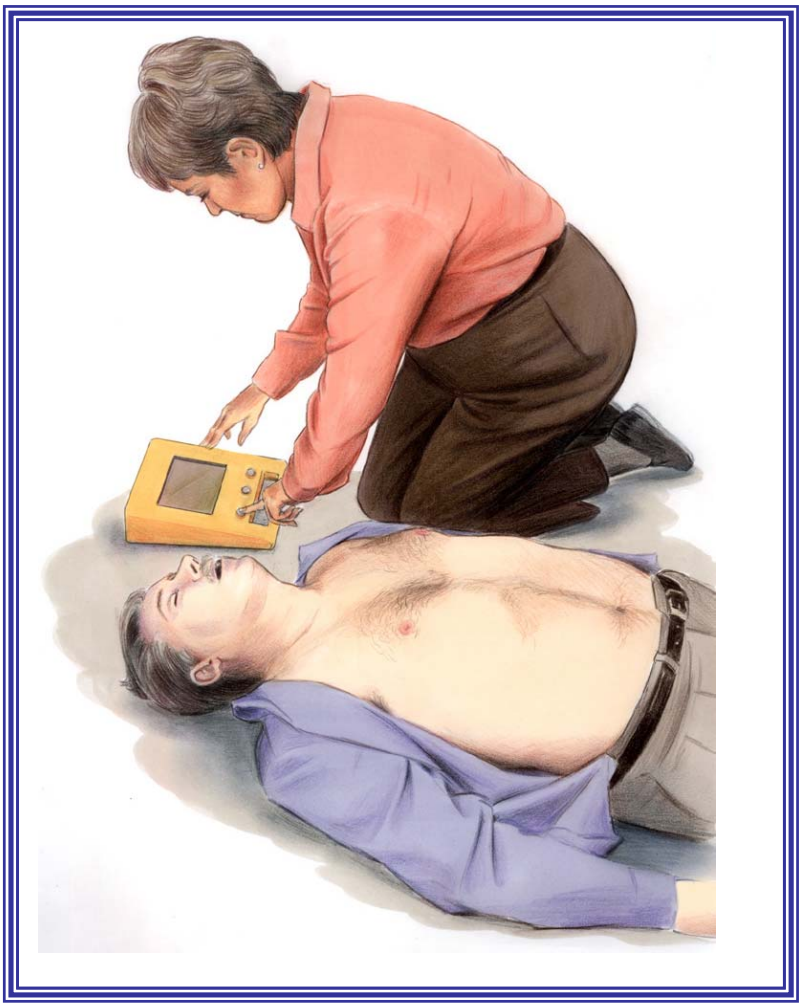
Louis J.

The death of Louis Acompora and thousands of Americans each year may be prevented by the application of early CPR and early defibrillation. However, these interventions must be provided within minutes or the brain and other vital organs will die due to lack of oxygen. The truth is that most EMS systems cannot provide defibrillation early enough to save the vast majority of victims of **sudden cardiac arrest (SCA).** Community-based defibrillation programs are needed to achieve this goal.

This book is designed to help schools strengthen their “Chain of Survival” through the implementation of CPR and defibrillation programs and is dedicated to memory of Louis J. Acompora so that victims of SCA can have the greatest chance for survival.

Chapter 1

Sudden Cardiac Arrest and Public Access Defibrillation



Sudden Cardiac Arrest (SCA)

Each year approximately 220,000 people die from SCA. The vast majority of these deaths are caused by the initiation of an abnormal heart rhythm called “ventricular fibrillation” or VF, a chaotic heart rhythm that results in loss of circulation and oxygen delivery to body tissues (See Figure 1). The only effective treatment to reverse VF to a normal heart rhythm is defibrillation (electric shock to the heart). However, defibrillation must be provided early. If left untreated for approximately 10 minutes this condition will result in irreversible brain death. Amazingly, lay people who have taken a short course in CPR and use of an AED can now provide defibrillation.

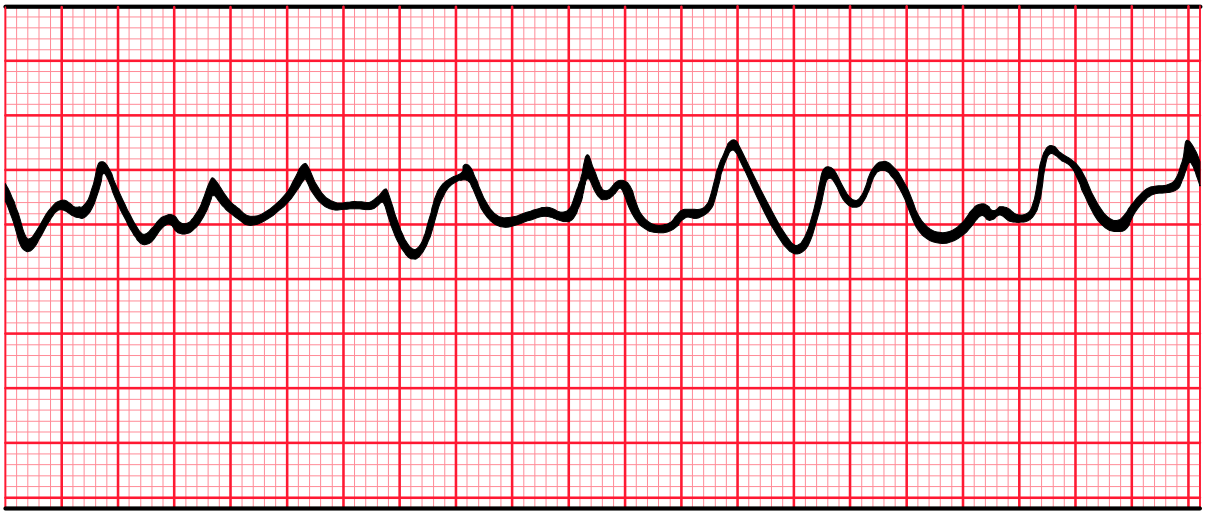


Figure 1. Ventricular fibrillation (VF) - a chaotic heart rhythm that results in loss of circulation.

For victims of SCA, *the time from collapse to defibrillation is the single greatest determinant of survival.* The window of opportunity is short. Survival from cardiac arrest caused by VF declines by approximately 7 to 10% for each minute without defibrillation. Beyond 12 minutes following collapse, the cardiac arrest survival rate is only 2 to 5%.

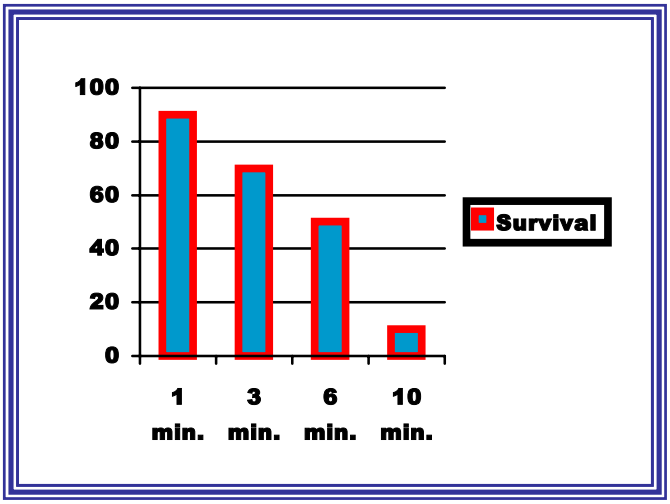


Figure 2. Survival from cardiac arrest declines by approximately 7-10% each minute without defibrillation.

Emergency Medical Service (EMS) systems that can be accessed quickly by telephoning 911 have been shown to improve survival from SCA by providing early defibrillation. However, most EMS systems cannot deliver defibrillation in a time frame that can significantly increase survival from SCA. As a result, the national survival rate from SCA hovers around a dismal 5%. In some cities it is as low as 1 to 2%.

The hope for increasing the survival rate rests with strategies that will deliver defibrillation early. When defibrillation is delivered in one minute, the reported survival rates can be as high as 90%. If defibrillation is delivered in less than 5 minutes, survival can be as high as 50%. Every minute that passes, the chance for survival decreases by 7 to10% (See Figure 2).

Commotio Cordis

SCA is far more common in the elderly population. The average SCA victim is approximately 60 years of age. In children, SCA is much less common than adults. Cardiac arrest in infants and children are typically related to respiratory diseases, airway obstruction, submersion, infections and neurological diseases. For children over the age of one, trauma is the leading cause of death. All of these causes of death may benefit from a strong chain of survival in the community.

Louis Acompora's death was caused by a relatively uncommon event called "Commotio Cordis". Commotio Cordis is an episode of VF induced by a sudden blunt trauma to the chest. A direct blow to the chest from a baseball, hockey puck, or other high-velocity object or collision with another player or a stationary object typically causes this condition. For VF to occur, the blow must happen at a precise millisecond of the heart's electrical cycle. This phenomenon has been observed in humans and is well documented in laboratory animals. When the blow to the chest occurs at this precise moment in the heart's cycle, the heart will "fibrillate".

At the time of the blow to the chest, Louis was a healthy young man who was wearing an approved chest protector. Current chest-protective technology does not seem to prevent this event from happening. Furthermore, it is unlikely that chest protectors can ever completely prevent this condition because many sports positions are incompatible with the use of chest protectors (i.e. baseball infielder or pitcher).

In a study of 55 cases of SCA among young sports participants, 90% of whom were 16 years of age or younger, 25 were playing in organized athletic events such as baseball, softball, and ice hockey. The remaining thirty children were playing informal sports at home, school or on the playground. None of the children showed evidence of any heart defect or disease. The blows usually cause no identifiable structural injury to the ribs, sternum or the heart itself.

Some cases of Commotio Cordis may be prevented by the use of better sports equipment, such as chest protectors, and softer balls. Of the 55 young athletes that were victims of Commotio Cordis, fewer than one in 10 survived the incident, although all had normal healthy hearts. With faster recognition and prompt action, a large percentage of Commotio Cordis cases are potentially reversible with the early application of (CPR) and defibrillation. Response time is a critical factor in resuscitating victims of Commotio Cordis. Of the five survivors in the study, four received CPR within one minute or less.

Chain of Survival

The actions taken during the first few minutes of a respiratory and cardiac emergency are critical to victim survival. This includes:

1) prompt recognition and action for heart attack, stroke, respiratory arrest and cardiac arrest
2) rescue breathing for victims of respiratory arrest
3) chest compression and rescue breathing for victims of cardiopulmonary arrest
4) defibrillation of patients with ventricular fibrillation with an automated external defibrillator (AED).
5) recognition and relief of foreign-body airway obstruction

These actions are emphasized in the American Heart Association's Chain of Survival (See Figure 3). Each link must be strong throughout the community to assure survival:

1) Recognition of the emergency and early access to 911;
2) Early CPR administered by bystanders at the scene;
3) Early defibrillation administered by rescuers at the scene; and
4) Early advanced care provided by EMS personnel.

Call 911 **CPR** **Defibrillation** **Advanced Care**

Figure 3. The American Heart Association's - Chain of Survival.

The chain of survival concept is designed to quickly bring help to the victim's side that can deliver the critical lifesaving interventions needed to survive. **CPR** brings oxygen into to the body through **rescue breathing** and circulates oxygen-saturated blood through the performance of **chest compressions.** CPR helps keep the brain and other vital organs alive until first responders can provide lifesaving **defibrillation.** This might include police, firefighters or trained rescuers in the school setting.

EMS or hospital personnel can then provide **advanced care** to help the victim who does not respond to defibrillation or to stabilize the heart rhythm following successful resuscitation to prevent subsequent cardiac arrest. Advanced care might include airway management, intravenous fluid administration or medications to stabilize the victim's heart rhythm.

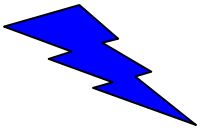
How Does the Chain of Survival Work?

Early access requires prompt recognition of emergencies that need time-critical Basic Life Support (BLS) interventions including heart attack, stroke, foreign-body airway obstruction, and respiratory and cardiac arrest. Early access (phoning 911 or activating the emergency response system) activates EMS providers quickly, who can respond with defibrillation and critical advanced care.

However, defibrillation delivered by EMS personnel often results in low survival rates since the time from collapse to defibrillation is long. In New York City and Chicago, survival rates of 1 to 2% were recorded in systems that used EMS providers to deliver the first shock!

Early CPR is the best treatment for cardiac arrest until the arrival of a defibrillator and advanced care. Early CPR prevents VF from deteriorating to asystole (flatline), may increase the chance of successful defibrillation, contributes to preservation of heart and brain function, and significantly improves survival.

Early defibrillation is the single greatest determinate of survival for victims of cardiac arrest. Public Access Defibrillation (PAD), placing AEDs in the hands of trained laypersons, holds potential to be the single greatest advancement in the treatment of VF arrest since the development of CPR. PAD programs using trained flight attendants and police officers have achieved extraordinary rates of resuscitation, as high as 49%. This nearly doubles the resuscitation rates previously achieved by the most successful EMS programs.



"Defibrillation is the single greatest determinate of survival from sudden cardiac arrest

These BLS actions—early access, early CPR and early defibrillation—serve as the foundation for emergency cardiac care throughout the community. Each community should identify weaknesses and strengthen their chain of survival through CPR training programs, implementing effective PAD initiatives and optimizing their EMS System.

The amazing truth is that students, teachers and other lay rescuers at the scene of the emergency can safely provide **three of the four links in the chain of survival**. Lay rescuers can easily be trained in CPR and use of an AED in as little as 4 hours.

What is an AED?

An AED is a computerized defibrillator that can: 1) interpret the victim's heart rhythm; 2) differentiate rhythms that require a shock from normal rhythms; and 3) guides the rescuer through the procedure of shocking the victim by the use of voice messages and visual prompts. AEDs are simple to operate. One study demonstrated that 6th grade students who received a brief orientation to the device could safely administer a shock in a time slightly longer than highly skilled EMS providers.

The use of AEDs has been studied extensively in pre-hospital care and has resulted in recorded survival rates up to 70%. In a study of casino security guards trained to deliver early defibrillation, 6 out of 10 victims survived SCA. The key to survival in this and other studies was time from collapse to defibrillation. In this study, when defibrillation was provided in less than 3 minutes, 75% of victims survived. Once again, time to CPR and defibrillation are key to survival.

Figure 4. An Automated External Defibrillator

Lay Rescuers and Defibrillation

The notion of lay rescuers defibrillating the heart seems unusual to most persons. Due to TV programs such as ER and Rescue 911, defibrillation is often identified as a skill provided by highly trained medical personnel. Fear of lawsuits often creates a barrier to early defibrillation programs. However, the use of AEDs by lay rescuers is now permitted in all 50 states and includes "Good Samaritan" protection to those who take action in an emergency. Good Samaritan Laws typically protect the **rescuer, the owner of the device and the medical director** who oversees the program.

Placement of AEDs in selected locations for immediate use by trained laypersons may be the key intervention to significantly increase survival from out-of-hospital cardiac arrest. The demonstrated safety and effectiveness of the AED makes it an ideal source of early defibrillation by trained laypersons. AEDs are of no value for non-VF arrests and provide no benefit after VF has been terminated. Therefore, proper opening of the airway, rescue breathing, and positive blood flow from chest compressions are critical. All persons who operate an AED still must be trained to provide effective CPR.

Are Schools Well Suited for Early Defibrillation Programs?

The best locations for the placement of AEDs are places where the probability of cardiac arrests is high. The probability of cardiac arrest is approximately one person in a population of 1000 persons each year. For example, in a population of 10,000 people you would predict approximately 10 cardiac arrests each year. This means that in a facility that houses 200 people for seven days per week, it is likely that one cardiac arrest will occur during a 5-year period. This estimate depends on several variables including the age of the population, the number of occupants or visitors and the length of time spent in

the facility. For example, in a study of locations of cardiac arrest, airports, malls and jails were among locations with a high rate of SCA. O'Hare International Airport, where millions of visitors walk through on a daily basis, documented 13 cardiac arrests in one year.

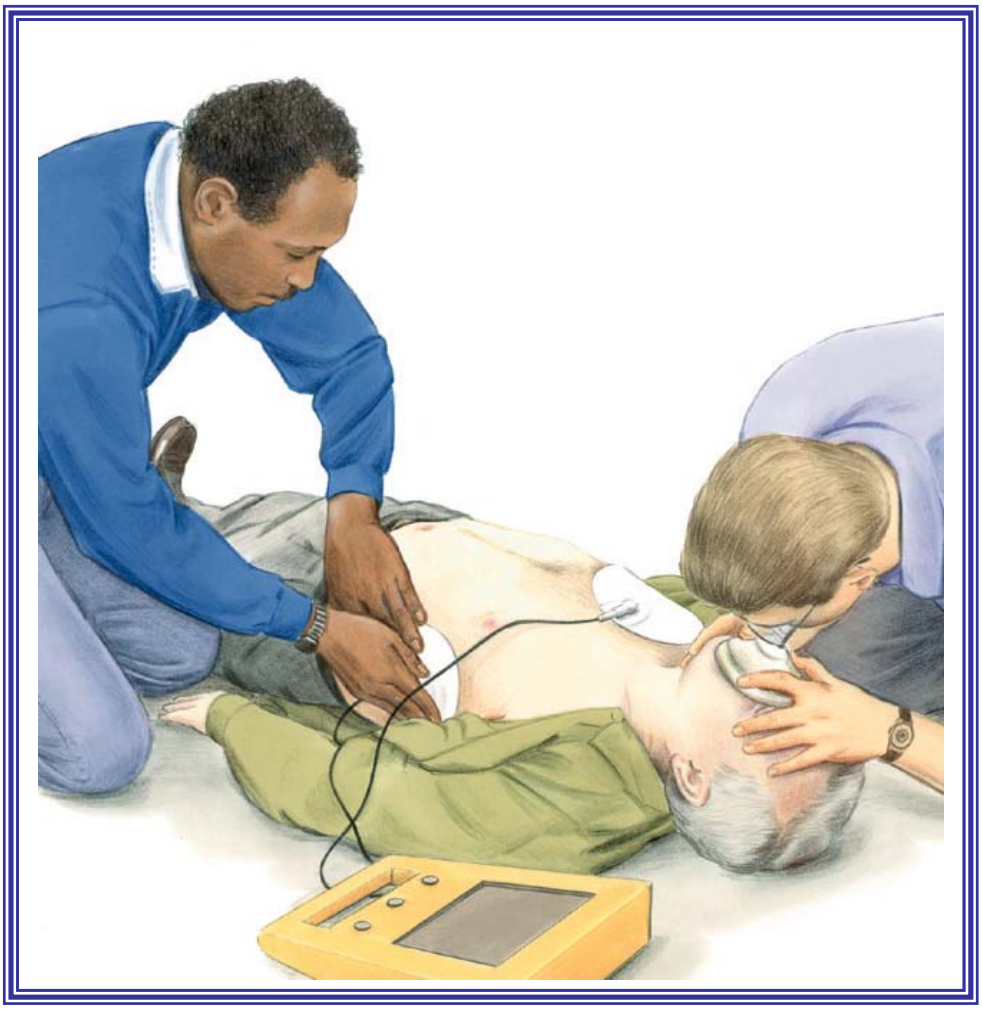
Critics would argue that schools have a relatively young population who attend school for only 8 hours per day, and approximately 200 days per year. Therefore, the school setting may not be an optimal location for the placement of AEDs. However, schools also contain many adults including teachers, administrators, parents and thousands of adult visitors each year. Sporting events, theatrical productions and ceremonies also attract large numbers of adults. These factors must all be considered when planning an early defibrillation program.

Another important factor that is considered when planning an early defibrillation program is cost. The good news is that early defibrillation can be implemented for as little as $4,000 in relatively small facilities, covering the cost of AEDs, training and disposables. Larger facilities may result in significantly higher costs since additional devices may be needed and more rescuers may be required to effectively implement the program.

Deciding on the feasibility and potential effectiveness of an early defibrillation program is best done when school personnel work with local medical personnel to evaluate the need and design the best program possible for the community.

"Deciding on the feasibility and potential effectiveness of an early defibrillation program is best done when school personnel work with local medical personnel to evaluate the need and design the best program possible for the community"

Chapter 2
Planning Early Defibrillation Programs



Components of a Successful CPR-AED Program

Simply training people in CPR and purchasing AEDs for the school cannot save lives. A system must be designed that includes well-trained rescuers, strategically placed AEDs to facilitate rapid deployment and continuous monitoring of the program to ensure its effectiveness.

Effective CPR-AED programs has several characteristics:

1) Leadership that designs and monitors the program to assure quality. This includes a task force coordinator, medical director and CPR-AED educator.
2) Placement of AEDs to assure rapid access when an emergency occurs.
3) Effective initial training, drills and refresher training to assure the acquisition and maintenance of CPR and AED skills.
4) The development of an operational protocol that clearly defines the actions of rescuers during an emergency.
5) Emphasis on safety to rescuers, bystanders and the victim.
6) Monitoring and maintenance of the AED to make certain that it is operational when needed.
7) Follow-up by the medical director after each emergency event to provide quality assurance and safety.
8) Integration with the community emergency medical system to coordinate efforts with Emergency Medical Service providers.

Developing a Task Force

The first and most important step in the development of a CPR and AED program is the formation of a **Task Force on Early CPR and Defibrillation.** A

school-based task force would typically consist of representatives from the school and medical community. When developing a task force "smaller is better". A task force that consists of a large number of members is likely to get bogged down in discussion and debate, a potential barrier to efficiency and effectiveness. A small task force of 5 or 6 members including a: Task Force Coordinator, Medical Director, CPR-AED Educator, Device Coordinator, School Administrator and a few "resource personnel" is more than enough to handle the implementation issues.
Following is a list of potential task force members and their respective roles and responsibilities:

Task Force Coordinator – The individual who will oversee both the implementation and maintenance of a CPR-AED program. This may be a school administrator, department chairperson or other individual who is motivated to assume this role. Members of the physical or health education staff might be good candidates for this position.

Responsibilities of Task Force Coordinator

- Develop agendas, formulate meeting dates and times, and chair all meetings of the task force.
- Designate responsibilities for task force members.
- Develop a budget in conjunction with the medical director and school administrator
- Provide follow-up to assure task force members achieve their objectives.
- Design a response system in conjunction with the medical director
- Design a method for orienting school staff and students to system activation

Medical Director - A physician who is expert in emergency cardiac care who will oversee all medical aspects of the CPR-AED program. Ideally, a regional physician should be selected who can provide guidance on the development of the program and continually monitor the quality of care. Physicians are often emergency physicians or cardiologists affiliated with the local hospital or EMS system. Many emergency physicians are more than willing to assume this responsibility since early defibrillation plays such an important role in the survival of patients who will ultimately be under their care.

Responsibilities of Medical Director

- Oversee all medical aspects of the program.
- Assist with device selection.
- Prepare a protocol for rescuer response and use of the AED.
- Conduct a QA review following individual events.
- Assist in the notification of regional EMS system.
- Work with training coordinator to assure the quality education of rescuers.
- Conduct drills to assure effective response system.
- Design a response system in conjunction with the task force coordinator
- Design a method for orienting school staff and students to system activation in conjunction with the task force coordinator.

Device Selection and Maintenance Coordinator – A school staff person who will facilitate the purchase and maintenance of the AEDs used at the school. This member should be someone who has experience in business transactions and is capable of ongoing monitoring and maintenance of devices. School maintenance personnel may assist in this process.

Responsibilities of Device Selection and Maintenance Coordinator

- Recruit vendors to demonstrate various AEDs.
- Supervise purchase of devices and related disposables.
- Design device-monitoring procedures in conjunction with Medical Director.
- Develop maintenance agreements with manufacturer.
- Members should be well oriented to the process prior to the first meeting. This manual can be sent out in advance to lay the foundation of understanding regarding a CPR-AED program. Feel free to copy this manual as needed to achieve this goal.

School Administrator – An Assistant Superintendent, Assistant Principal or Department Chairperson who will provide administrative support for the project and serve as a liaison with key groups in the school or district.

Responsibilities of the School Administrator

- Identify funding sources for the project and coordinate payment of vendors and consultants.
- Assure compliance with school policies.
- Serve as a liaison with the school board, superintendent or principal, PTA and other groups that must be oriented to the process.

Athletic Coordinator – The school athletic director, physical education department chair, or coach who will provide leadership for the development of CPR-AED activities during athletic events.

Responsibilities of the Athletic Coordinator

- Work with coordinator and medical director to develop an emergency action plan for sporting events.
- Organize coaches, trainers and others who will serve as rescuers.

Getting Started

The Task Force Coordinator should contact the local hospital or EMS system to recruit a medical director and a CPR-AED educator for the project. The local Director of the hospital's Emergency Department or the EMS system Medical Director are usually informed about this type of program and may volunteer or direct you to the appropriate person. Invite these individuals to serve on the task force and set a date for the first meeting of the task force. Recruit the other personnel form the school system. Try to keep the process simple. It should take no more than four or five meetings to get the project up and running. Thereafter, the task force may have to meet once or twice a year to keep the program on track.

Prior to the first meeting, the Task Force Coordinator should meet to formulate an agenda for the first meeting. Appendix A provides a sample agenda. The first meeting should be devoted to orienting the tasks force members to concept of CPR-AED programs, developing a budget, and assigning members responsibilities. These initial responsibilities will include identifying a funding source, arranging a meeting with AED manufacturers, performing a "walk through" of the facility to plan AED placement, developing a protocol, and designing a first draft response system for the program. The coordinator and medical director should carefully explain these functions.

Appendix B provides a sample PowerPoint presentation on the CPR-AED program that can be used by the medical director or coordinator to orient the task

force or others associated with the program in the school setting. A CD also accompanies this manual for this purpose.

CPR-AED: "Success is in the Detail"

During the development phase of the project it is critical to remember that "success is in the detail". Attention to detail is critical at every phase of development. Rescuers must be selected that are available throughout the workday in the school who can respond immediately when an emergency occurs. How will a student or staff person who is not trained activate the system? How will the rescuers be alerted to assure a timely response? Where will the AEDs be placed to assure easy access and rapid response throughout the school of athletic field? How will rescuers be trained to assure the appropriate performance of lifesaving skills when they are needed? How will skills be refreshed to assure long-term retention? These are all critical issues that must be considered by the CPR-AED task force during program development.

Public Access Defibrillation Excellence: The O'Hare Model

O'Hare International Airport in Chicago represents one of the most successful PAD programs developed to date in the United States. The planners at O'Hare meticulously designed and implemented each component of the PAD program to assure a timely response, effective performance of rescuers and rapid activation of the EMS system. The results were extraordinary; a survival rate of 70% for victims of cardiac arrest due to ventricular fibrillation. Compare this to a national survival rate of approximately 5%!

What factors made O'Hare so special? First, they carefully placed AEDs every minute of a brisk walk from any location throughout the airport facility. This assured that an AED was never more than 2 minutes away from a collapsed victim "roundtrip". Second, they placed defibrillators in conspicuous locations near restrooms so that they would be easy to find during an emergency. They were placed in boxes that when opened, automatically summoned the airport

police to assist in the rescue. Third, they trained over 2000 airport employees in CPR and use of the AED. In spite of this, visitors who were nurses, doctors and EMS providers traveling through O'Hare performed 55% of the resuscitations.

Needless to say, this was an extraordinary effort that has set the standard for optimal PAD programs. Programs in the school setting need not be so comprehensive or complex but they would be well served by modeling some common principles. The remainder of this manual will describe the key components needed to design, develop and implement an effective PAD program. This model is not presented as strict dogma for PAD programs but rather a template to be used and modified according tot he needs of a specific facility.

Chapter 3
Placement of AEDs and Selection of Rescuers

Placement of AEDs

Placement of AEDs will be one of the most important choices made by the school. The location of the AED will determine the speed at which the device will be delivered to the victim's side in the event of a collapse. There are three important considerations when selecting locations for the AED:

The AEDs should be placed within 1 minute of a brisk walk from any location in a facility (or approximately 2 minutes **roundtrip** from a collapsed victim). For athletic and other outside events, the AED may be transported to the event by school staff.

The AED should be placed in a conspicuous location so that rescuers will always know the location of the closest device.

When possible, they should be located near a phone so that the EMS system can be activated simultaneously with the retrieval of the AED.

To select the appropriate locations the task force can review a floor plan for the facility and then conduct a "walk through" to estimate a retrieval time for device from any location in the facility (See Figure 4). The point of this approach is minimize the time from collapse to defibrillation. Since every minute that passes survival decreases by 7-10%, this model sets a goal of 60-90% survival depending on the location of collapse in the facility. This includes time for assessment of the victim, retrieval, and use of the device. Obviously there are other possible variables that may decrease the probability of survival including delayed discovery of the victim, the need for single rescuer to call 911 and use the device and other variables beyond the control of the plan. Once again this model was used in O'Hare International Airport and resulted in a 60% survival rate.

The placement of a device may be affected by other variables. Some schools are concerned about conspicuous placement of AEDs for fear of vandalism and theft. Using a wall storage case that sounds an alarm when opened can help alleviate this problem. Some wall storage cases have also been

wired to activate the local EMS system upon opening. The task force, after considering all these and other issues, can determine the specific configuration. However, placing a device in a locked case or in a hidden location is strongly discouraged since it may cause a delay in the application of the device.

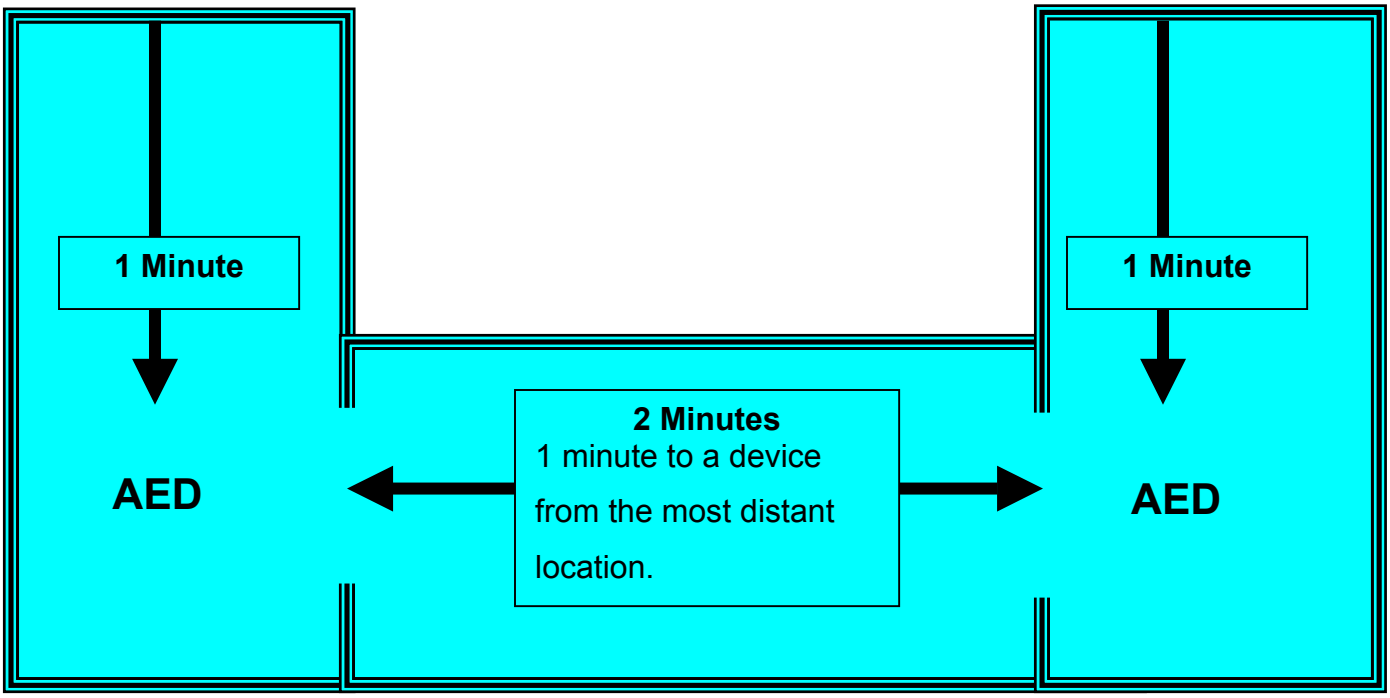


Figure 4. This sample floor illustrates the method for placement to assure that a device is never more than 1 minute from any location in the facility or 2 minutes roundtrip from the victim. With this model a 60-90% survival rate is possible for victims of SCA due to ventricular fibrillation.

AEDs at Athletic Events Outside of the School Building

Athletic events may require additional organization. Since the athletic field is often a distance from the school building, the AED may be brought to the event site. This is particularly important when events are attended by a large number

of persons. When possible, coaches, trainers and referees should be trained in CPR and use of the AED. This is important since these individuals will be in the immediate proximity to emergencies that occur on the field or in the stands.

When possible, rescuers should be designated at a particular event and communication equipment should be made available to retrieve the AED and call 911. An emergency action plan can be developed that specifically states the actions of rescuers and other personnel following a collapse. This would include the following:

- A location for the AED to be placed at the event. This may include an AED that is placed at the entrance of the building near the athletic fields or an AED that is carried on the field during the event.
- A method for quickly retrieving the AED following collapse. This might include a designated person (i.e. trainer, coach, etc.) who be responsible for retrieving the when a collapse occurs.
- A designated person to call 911 and to meet the arriving ambulance in order to direct EMS providers to the scene

The configuration of the emergency action plan on the athletic field should be developed by the AED task force in conjunction with the athletic director or athletic department chair. The exact methods use in the plan depends on may factors including size of the facility, number and type of personnel, number of AEDs available at the facility and a variety of other factors. Appendix C provides a sample plan that can serve as a template for the program.

Selection of an AED

The selection of an AED should be done in cooperation with the program medical director in order to select a device that meets the operational, quality assurance, and cost specifications of the program. There are only a few brands

and models of AEDs available in the marketplace. These devices are extremely similar in their operational steps, size, weight and cost. There are slight differences in the methods used to analyze data following the event. Most AEDs have the ability to retrieve computer data following the cardiac arrest event. The method through which this occurs differs from unit to unit. It is critical for the medical director to consider the approach that he or she will review "event data" since it is an important part of the quality assurance process. The event log from AED typically provides the medical director information about; when the device was turned on, the presenting heart rhythm of the victim was at the time of cardiac arrest, when the first shock was provided and what the subsequent heart rhythms were prior to the arrival of EMS. These events are then used by the medical direct along with information from the rescuer to evaluate the effectives of the system at the school. If there were delays in deployment or inappropriate actions based upon the data, the medical director can refine and improve the response system. This is also a very important medical legal documentation. Sales personnel from the major manufacturers can be invited to a meeting of the task force to provide presentations on the benefits and cost of their device. If several devices are being purchased in a given school district, it may be possible to negotiate a reduced price with the manufacturer.

Other Equipment

Other equipment will be needed to implement the AED program. This will include face shields and/or mouth-to-mask devices, razors to shave the chest of victim's with excessive chest hair, towels, extra sets of electrode pads, spare batteries and the accessories needed to perform CPR and operate the AED. A complete equipment list is located in Appendix D.

Selection of Rescuers

Selection of individuals who will serve as rescuers for the program should occur early in the development of the program. Rescuers should be selected based upon their location in the facility, ability to respond throughout the workday, physical ability to perform CPR and other rescue skills, and willingness to serve as a rescuer.

In the school setting, there are also special considerations related to extracurricular activities. For example, AEDs may be needed at major sporting events, assemblies, theatrical productions and meetings that are held at the school. To meet these objectives, maintenance personnel, coaches, music and theater teachers, and other special event coordinators should be trained to serve as rescuers.

To achieve the selection process a survey can be sent to school staff that identifies the key issues related to serving as a rescuer including their willingness to participate (See Appendix E). The task force can then review the returned surveys and select the best rescuers for the program. As a rule it is better to have several rescuers in each location of the facility or sports venues. This will account for holidays, sick time, staff turnover, and other factors that will deplete the response system of rescuers.

Chapter 4

Training the Rescuers and Setting up the Response System

Training the Rescuers and Drills

The skills needed to serve as a rescuer for a CPR-AED program includes, rescue breathing, use of a mouth-to-mask device, CPR, relief of foreign body airway obstruction and use of an AED. These skills can be taught in a 4-hour course available through the American Heart Association (AHA), American Red Cross (ARC) or National Safety Council (NSC). The program medical director should be able to assist you in identifying local trainers to achieve this goal. Often sponsor training personnel are available at local hospitals.

Since the skills that are learned are used so infrequently it will be important to have regular drills at the school to assure retention of knowledge and skills. There is no set interval for this activity but drills every 3-6 months represents the standard use in most CPR-AED programs. After the initial development of the program it is helpful to conduct several drills to test the effectiveness of the model. A manikin can be placed at random locations in the school and the system can be activated and timed. Rescuers skills can be evaluated and the system can be modified as needed including rescuers reinforcement. This will require the cooperation of the CPR-AED educator and the medical director to assure appropriate evaluation and feedback.

Rescuers are recommended to renew their CPR-AED certification approximately every two years.

School-based CPR-AED Programs

Schools that are committed to CPR-AED programs may chose to train their own Basic Life Support Instructors through the local American Heart Association Training Center. This will allow reduction of the long-term cost of the program and permit the training of students in CPR and use of an AED. There is a national school-based program sponsored by the American Heart Association

that is specifically designed for middle and high school students. This model includes the training of several teachers at the school as Basic Life Support Instructors. These teachers can then integrate CPR and AED training in their health and physical education programs and train staff at the school as rescuers. A self-sufficient school-based program can make the implementation of CPR-AED strategies much simpler to develop and maintain.

The development of a CPR in the School program can also create an ongoing relationship with the local hospital, creating a partnership that can help during career days and provide opportunities to educate students in the field of healthcare. Many programs have sponsored field trips to the local hospital as a "real life "orientation for middle and high school students. This relationship is also helpful when an emergency occurs at a school that requires interface with the local emergency department.

Developing a Response and System Activation Protocol

Protocols must be developed that clearly provide instructions occupants of the facility in the event of a victim collapse. This protocol should delineate; how the CPR-AED system at the school is activated, the importance of calling 911 immediately, how the first arriving rescuers on the scene should coordinate resources, and procedures for follow-up after the victim has been transported to the hospital.

Response System

An internal response system for the school must be developed and all students and faculty must be oriented to the system. Once again, time is the critical variable in cardiac arrest. Bystanders who discover or witness a collapse should be instructed to call a central number at the school where rescuers can be

alerted to the event and 911 can be called. Bystanders and rescuers should always be certain that 911 has been called early to assure a rapid EMS response. In a school, it may be wise to make the administrative office the initial point of contact in an emergency, except when it involves an offsite activity such as a sporting event or a nighttime activity when the administrative office may not be staffed. During the day, the administrative office can alert trained rescuers via the public address system or by telephone if appropriate. Rescuers can be advised as to the location of the collapse and respond immediate. To maintain confidentiality of the event it may involve the use of codes such as “code blue in the south first floor corridor”. This will alert all CPR-AED rescuers to the location of the event while maintaining some level of confidentiality.

Student and staff in the school will need an initial orientation to the system and some reminder on how to activate the system. An assembly that stresses the importance of immediate notification of the administrative office can be effective along with presentations at faculty meetings. It is also helpful to place posters in classrooms and auditoriums as a reminder of actions to take during an emergency. Some facilities have also placed stickers on phones as a reminder. These measures will also be helpful for the visitor who will not have been oriented to the response system. Once again, it is critical to stress the importance of an immediate call to 911 (See Figure 5).

Figure 5. Sample emergency response poster

Administrative office staff will also require a comprehensive orientation, since they will often be receiving the call for help. They should be provided with specific written instructions on how to alert rescuers and the local EMS system in the event of a notification of an emergency at the school (See Figure 6).

Emergency Action Instructions

When an individual calls the Administrative Office with a Medical Emergency take the following actions:

1. Ask the caller if they have called 911, if not call 911 immediately or direct someone to call 911.
2. Record the specific location of the event. **Be precise** so that the response of rescuers is not delayed. This should include room number, or area of the school.
3. Announce the following over the public address system “Code Blue in (provide exact location of the event).
4. Notify the Principal or Assistant Principal immediately.
5. Document the event and time on the Emergency Response log.

Figure 6. Emergency Instructions for Administrative Staff.

Rescuers Response

Rescuers should be oriented to the emergency response system and follow a specific protocol that defines the roles of the first and subsequent responding rescuers. When the first rescuer arrives on the scene he or she

should immediately instruct someone to activate the response system and retrieve the AED. That rescuer should start CPR until the AED arrives. Rescuers should carry face shields on their person to avoid direct mouth-to-mouth contact during resuscitation. A mouth-to-mask device is stored with the AED so that it can be used for rescue breathing the once the device arrives. If alone, the rescuer should assess the victim, call 911 and retrieve and use the AED. Obviously, the rescuers action will be dictated by the number of bystanders and the number of trained rescuers on the scene. However in priority order the following should occur regardless of the number of persons in attendance:

1) Check to see if the victim is unresponsive.
2) Direct someone to call 911 (or call if you are alone).
3) Direct someone to retrieve the AED.
4) Perform CPR, if needed.
5) Apply the AED as soon as cardiac arrest has been confirmed and the AED arrives on the scene.

Monitoring the System

As mentioned previously, AED programs require attention to detail. This includes the quality of the system that is organized, rescuers trained and ongoing maintenance of all elements. This is especially true for the AED. AEDs must be checked regularly according to manufacturers recommendations. Fortunately, AED checks are simple and all AEDs have a self-test that can determine the readiness of the device. The battery life of AEDs is approximately 5 years (if not used). The disposables must also be checked regularly. AED pads have an expiration date that must be monitored.

Drills should be conducted on a regular basis to assure that the system is working properly and that rescuers retain key lifesaving skills. There are many

methods for refreshing skills including video review, computer interactive, and peer practice. Again, there is no set interval. However, most AED programs use 3 to 6 month reviews.

Good luck in the development of your AED program and be thankful for acquiring the most important skill an individual can possess, the ability to save a human life. Take a moment to review table 1 that summarizes the steps needed to develop an AED in the School Program.

Summary of AED in the School Program

- Develop an AED Task Force.
- Secure funding for the program.
- Select and purchase equipment for the AED program.
- Place AEDs every minute of a brisk walk throughout the school. Consider bringing AEDs to athletic fields for offsite activities.
- Place AEDs near phones so that 911 or the central office can be called when an emergency occurs.
- Select rescuers through the use of a survey.
- Train rescuers in an approved AED program.
- Develop an Emergency Action Plan for onsite and offsite activities.
- Orient staff and students to the emergency response system.
- Place posters and/or phone stickers to remind students, staff, and visitors how to activate the system.
- Develop protocols that define the actions of rescuers in an emergency.
- Monitor and improve the system using drills.

Appendix A

CPR-AED Task Force
Sample Agenda for First Meeting

Meeting Location _____ Date_____ Time_____

Goals and objectives of task force **Coordinator**

Medical necessity of CPR-AED program **Medical Director**
- Principals of early defibrillation
- Importance of time
- Overview of AED program

AED issues
- Selection of device
  - Assign coordinator
  - Set date for manufacturers to show devices to group
- Maintenance of AEDs
- Placement of AEDs

Recruitment of rescuers **Coordinator**
- Rescuer profile
- Availability throughout workday
  - Volunteers
  - Previous emergency medical training
- Recruitment process
  - Survey of prospective volunteers
  - Key potential volunteers

Training **BLS Instructor**
- Initial training
  - Select dates
- Drills
- Refresher training

Appendix B

PowerPoint Presentation

"AEDs in the School"

The following presentation can be used to educate individuals about the AED in the School Program. This might include administrators, school boards, PTAs, parents, and other members of the community. It can also be used in conjunction with the "AED in the Schools Video" to organize a fundraising effort in the community to purchase AEDs or support the program.

The presentation can be presented through a computer or data projector or converted into slides or overhead transparencies.

Appendix C

Sample Emergency Action Plan

For all major events occurring on the school athletic grounds the AED should be carried to the field by the athletic trainer or coach (or any other designated person). Individuals should be assigned roles by the coach before the beginning of the game or event. In the event of an emergency on the athletic field, the persons listed below are assigned the following duties:

Retrieve the AED – Designated Person _____

If the victim is unresponsive, you should quickly retrieve the AED and deliver to the victim's side. The AED should be brought to the scene for all unresponsive victims so there is no delay in retrieval.

911-Caller - Name _____

You should quickly determine the nature of the problem and if appropriate call 911. You should be prepared to provide the following information to the 911 operator:

- **The location of the call.** You should advise the operator to instruct the EMS providers to arrive at the cross streets of Main and Maple.
- **The nature of the emergency.**
- **The number you are calling from**
- **What care is being provided at the scene.**
- **You should not hang up until instructed by the operator.**

After calling 911 you should go to Main and Maple to meet the ambulance and direct them to the scene.

If there is only one trained CPR-AED rescuer on the field, that individual should remain with the victim and direct others to make the call and retrieve the AED.

Appendix D

AED Equipment List

Following is a sample list of equipment needed for an AED in the School program. The actual number of AEDs will be determined during the evaluation phase of the task force. The specific number of items below are stored with or located near each AED placed in a facility. Additionally, each rescuer should carry a face shield to perform rescue breathing prior to arrival of the AED and the mouth-to-mask device. The American Heart Association training program will provide instruction in all of the devices listed below.

Equipment	Quantity at each AED location	Purpose
AED	1	Ideally, there should be an AED placed within a **1 minute brisk walk** from all locations in the facility.
Spare battery	1	One spare battery should be stored with the AED as a safegaurd for a primary battery failure.
Telephone	1	If possible, the AED should be placed adjacent to a telephone so that EMS can be called while rescuer retrieve the AED.
One Safety Razor	1	The razor is used to remove exceess hair from the chest prior to placement of the AED electrode pads.
One Towel	1	A towel is used to dry the victim's chest (if needed) prior to placement of the electrode pads.
Mouth-to-mask device	2	Rescue breathing is provided trhough this mask to avoid direct mouth-to-mouth contact during CPR. Additionally, a face shield can be carried by each rescuer at the facility.
Disposable gloves	2	Disposable gloves prevent hand conact with victim's body fluids.
Manufacturer AED Inspection Checklist	1	Checklist for weekly evaluation of the AED.

Appendix E

CPR-AED Rescuer Survey

We are developing a group of rescuers who will respond to emergencies at the school and if needed provide CPR and use an Automated External Defibrillator (AED). There will be several individuals selected from each area of the school. We are particularly interested in individuals who are physical educators, coaches, and maintenance personnel, since they could provide coverage at sporting and other special events. The following questions will help us to select the best rescuers for the program.

1. Are you willing to volunteer to serve as a rescuer who provides CPR and Defibrillation to victims of cardiac arrest? Training will be provided that prepares you for the role of a rescuer in an American Heart Association program that takes approximately 4 hours to complete.

   Yes ☐ No ☐ Maybe, I need more information ☐

2. Do you suffer from any respiratory disorders such as asthma, emphysema or chronic bronchitis?

   Yes ☐ No ☐

3. Do you suffer from serious back problems that may prevent you from learning or performing CPR?

   Yes ☐ No ☐

4. Do you suffer from heart disease or other serious condition that may prevent your participation?

   Yes ☐ No ☐

5. Do have any previous emergency medical training (i.e. nursing, EMT, CPR/First Aid)?

   Yes ☐ No ☐

6. Do you have a family member at home that has heart disease or other condition that places them at risk for sudden cardiac death?

   Yes ☐ No ☐

Print Name _____ Signature_____