

Heart&Stroke  
**Automated  
External  
Defibrillation**

**Whose life will  
YOU need to save?**



**HEART &  
STROKE  
FOUNDATION  
OF CANADA**

*Finding answers. For life.*

## EXECUTIVE SUMMARY

Sudden cardiac arrest (SCA) can strike anywhere and at any time. It can happen to anyone: an employee in the workplace, a shopper in a mall, an athlete on the playing field, a spectator at an event, a traveler at an airport or in a plane, ferry or train, or a pedestrian on a busy street.

How prepared is your organization to deal with sudden cardiac arrest? Most communities and companies rely on a first aid attendant, staff member, or bystander to perform cardiopulmonary resuscitation (CPR) until Emergency Medical Services (EMS) arrive at the scene. **Combined with CPR, the use of an Automated External Defibrillator (AED) may increase the likelihood of saving a person's life by 75% or more over CPR alone.**

An AED is a small, portable, and easy-to-use device that assesses the heart of a person in cardiac arrest for a shockable rhythm. If such a rhythm is detected, the provider is instructed to press a button to deliver a shock or series of shocks to the victim's heart, stopping the heart to allow it to return to a normal rhythm. If no shockable rhythm is detected, no shock can be given and the provider must perform CPR until professional help arrives.

Until recently, only medical and paramedical staff used AEDs. However, the advent of safe and easy-to-use AEDs now makes it possible to extend the use of AEDs to people with little or no medical background. The training required is relatively brief and is usually delivered in conjunction with a CPR course.

An AED program could be right for your organization or community if:

- it is a place where people gather for work or leisure
- it is in a location that EMS cannot access quickly (within 5 minutes) because of long distances, heavy traffic, or building layout (for example, a high-rise or a large venue)
- it is a place where there are people at high risk for cardiac arrest, such as a seniors' centre
- the health of workers, clients, or community members is an organizational priority.

To establish an AED program, your organization or community will need to make decisions about the six essential program elements:

1. What type of AED(s) will be purchased and how many, where will they be located, and how will they be accessed and maintained?
2. Who will be trained to use an AED, and how will the training program be set up?
3. Who will oversee the AED program?
4. How will EMS be contacted in an emergency?
5. How can the AED program be integrated with other heart health programs such as education about healthy lifestyle choices and CPR training?
6. How will the program be funded?

AEDs combined with CPR offer the best chance at saving a life in the event of a cardiac arrest. If your organization is interested in an AED program, you can contact your local Heart and Stroke Foundation office for more information.

## **Introduction**

Sudden cardiac arrest (SCA) occurs when the heart unexpectedly stops beating effectively. SCA is a major cause of death in Canada. It can happen at any age, although most victims are over the age of 40. It can happen anywhere and anytime, but it usually happens in the home, workplace, or community, away from the advanced life support available in the hospital environment.

In sudden cardiac arrest, the heart no longer pumps blood to the brain. Without the oxygen and nutrients supplied by the blood, brain cells begin to die within minutes, and death soon follows. Cardiopulmonary resuscitation (CPR) can help maintain oxygenation and blood circulation, but unless defibrillation is performed quickly, survival is unlikely.

SCA is the most prevalent medical emergency today, however it does not have to be fatal. For a few minutes before the heart stops completely, it usually goes into a rhythm called ventricular fibrillation (VF), a fluttering of the heart muscle. During VF, it is often possible to shock the heart back into a normal rhythm with a device called an Automated External Defibrillator (AED). Through pads applied to the chest, the AED analyzes the heart's electrical activity and determines if a shock might be effective. The window of opportunity for using an AED is small – defibrillation is more successful if performed within 5 minutes of the cardiac arrest. Studies show that the chances of survival decrease 7-10 percent with every minute that passes after the arrest.

An AED is a small, portable, and easy-to-use device. Adhesive pads connected by wires to the AED are applied to the person's chest. The AED detects the electrical activity of the person's heart and checks the heart's rhythm. If the heart is in VF, the AED instructs the provider to press a button that delivers a controlled shock to the victim's heart. The shock stops the heart and allows it to resume a normal rhythm. If the person is not in VF, then shock is not advised and cannot be given. CPR should be continued until advanced life support arrives.

**When an AED is immediately available, the chance of survival from sudden cardiac arrest can increase by 75% or more over CPR on its own.**

Although physicians have used defibrillators for years, recent advances in their design have made them safe and easy to use by people with little or no medical background. This means that AEDs can be used by members of the public such as first aid attendants, security guards, teachers, coaches, recreational facility staff, and family members or caregivers of people at high risk for cardiac arrest, as well as firefighters, police, paramedics and other health care providers.

In a few provinces, defibrillation is still seen as a medical procedure and programs must be overseen by a physician. However, most provinces and territories have legislation that permits public access programs and legally protects anyone using an AED in an emergency situation. Where legislation is not yet in place, initiatives are under way to change laws so that public access AED programs can be established wherever groups of people congregate, and where there are people at high risk of sudden cardiac arrest. The onus is now on organizations, communities, and companies to initiate AED programs.



## The Chain of Survival™

The HSFC established the Chain of Survival<sup>1</sup> to depict a systems approach to Emergency Cardiac Care. The seven links in the Chain of Survival are:

- **Healthy choices** in lifestyle can help reduce the risk of heart disease, stroke, and injury.
- **Early recognition** of the warning signs for heart disease and stroke, and of illness and injury in infants and children, can reduce delays to treatment.
- **Early access** to emergency medical services (EMS) by calling 911 or the local emergency phone number brings trained medical help to the scene.
- **Early CPR** is started as soon as possible on a person who does not have visible signs of circulation (normal breathing, coughing, or movement) and has no pulse, to ensure that the vital organs receive oxygen until trained professionals arrive.
- **Early defibrillation** shocks a heart that has stopped beating effectively and allows the heart to re-set to a normal rhythm.
- **Early advanced care** by trained health care professionals may be provided at the scene, on the way to the hospital, or at the hospital.
- **Early rehabilitation** following a critical event such as a heart attack or stroke may help the survivor, caregivers, and family face new challenges and return the survivor to a productive life in the community.

The Chain of Survival provides Canadian citizens with the best chance at preventing diseases that affect the blood supply to the heart and brain, and of surviving a heart attack or stroke should one occur. Early defibrillation is the most effective link in the Chain of Survival, but it is only one link in the Chain. An AED program should be part of a larger program to promote healthy lifestyle choices and support community initiatives to strengthen the other links in the Chain.

Early defibrillation is a safe, simple, and effective way to save lives. The likelihood that a person will survive cardiac arrest involving VF decreases 7 to 10% with

<sup>1</sup> The *Chain of Survival* is a registered trademark of the Heart and Stroke Foundation of Canada

every minute that defibrillation is delayed.<sup>2</sup> With increased access to AEDs, survival from sudden cardiac arrest can be increased by 75% or more over the use of CPR alone. Locations with a high incidence of cardiac arrest and an established AED program have reported “save” rates of up to 75%. The survival rate is even higher if the AED is used in the first few minutes after the arrest.

## **What is the HSFC doing to promote AED programs?**

As the recognized Canadian authority on basic life support including CPR and AED, HSFC has taken on a leadership role in promoting and expanding access to defibrillation.

Early, effective defibrillation can only be achieved if an AED is available at or near the site of the cardiac arrest, or can be provided quickly by emergency response personnel. Unfortunately, quick EMS response isn't always possible, and even the best systems are subject to delays due to traffic, reduced access, vehicle availability, and the size of high rises and other venues. To achieve early access to defibrillation, there must be widespread awareness of the need for and value of AED programs, increased access to AEDs in the community and in workplaces, and widespread AED training programs to ensure that there are appropriately trained people available to operate the equipment when necessary. AEDs are now available in many workplaces and communities, and are available to the public.

In October 1997, the Emergency Cardiac Care Subcommittee of HSFC approved a statement on Public Access to Defibrillation that supported AED as a safe and easy to use intervention that may be effectively administered by trained medical and non-medical personnel. HSFC also recommended that early defibrillation initiatives be implemented within the community Chain of Survival, and that family members or companions of individuals at high risk for a cardiac event be given the option to be trained to use AEDs.

In 1998, HSFC introduced a new training program entitled AED for Targeted Responders (individuals with a duty to respond in an emergency), and followed up with an instructor manual for the 4-hour course. The course included a nationally approved sequence for the use of an AED. This was subsequently adopted by other major training agencies in Canada.

In 1999, the Heart and Stroke Foundation of Canada organized a conference, *Access to Defibrillation - A Vision for 2000 - Strategies for Canada*, to bring together the stakeholders in the drive to increase access to defibrillation. Attendees at the conference included physicians, nurses, paramedics, ski patrol members, firefighters, police, government representatives, Heart and Stroke Foundation affiliates across Canada, as well as all major training agencies, including St. John Ambulance, Canadian Red Cross, Canadian Ski Patrol and Lifesaving Society. The consensus of the conference was strong support for

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Guidelines 2005 for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation* 2005; 112(supplement): IV-1- IV 5.

increased access to defibrillation and for education of lay rescuers regarding the importance of early defibrillation and AEDs.

In 2000-2005 the HSFC developed essential educational resources, both for those who take AED courses, as well as for all Canadians. Resources included printed and web-based information, public service announcements, public displays, and other educational material designed to increase public knowledge and access.

In 2006, HSFC launched new resuscitation training programs which integrated AED information and/or training into all CPR training programs. The HSFC also produced workplace- and community-based standardized training programs and systems in conjunction with key stakeholders. An extensive range of courses are available to the public and professional healthcare providers alike. Other major training agencies are implementing similar programs. *In so doing, more than 1.5 million Canadians who take CPR courses annually will be exposed to or trained in how to use an AED.*

The HSFC AED training programs will lead to increased familiarity with AEDs in communities and workplaces, and awareness by health professionals and the public of the importance of risk factors for heart disease and stroke, early recognition of the signals, early CPR, and early access to defibrillation. As each provincial College of Physicians and Surgeons and other regulators eliminate the barriers to rapid defibrillation, there is a need and an opportunity for corporations and communities to increase availability and access, thereby strengthening the Chain of Survival and improving AED access in Canada.

We expect that many others will join the list of locations where AEDs are already available. Canadian examples include airports, arenas, golf courses, government buildings, industrial sites, major airlines, the House of Commons, the Senate, Offices of the Solicitor General, many city halls and local government buildings, regional, provincial and national corporate offices, casinos, and the Heart and Stroke Foundation offices. It is expected that this will quickly expand to include such venues as convention halls, large malls, all government buildings, all airports, and correctional institutions. Several cities across Canada, including Ottawa, Toronto, Calgary, Mississauga, Edmonton, Saskatoon, Regina and Vancouver have launched citywide Heart Safe™ programs to increase access to AEDs and promote their availability.

HSFC also advocates for legislation to facilitate AED programs. This includes Good Samaritan legislation, in the areas where such legislation does not exist, to ensure that Good Samaritans are protected for attempting to save a life. HSFC's strong support for wide access to AEDs and AED training is also reflected in HSFC's national position statement on Public Access to Defibrillation, which is accessible on the HSFC website at [www.heartandstroke.ca](http://www.heartandstroke.ca).

## Why should your organization invest in an AED?

Whether your organization consists of a multi-site workplace, a whole building, or a floor of a building or a small office, you should consider the advantages of having an AED program.

The closer the AED and a trained provider are to the victim, the greater the chance of survival. *The implementation of an AED program may be the most cost-effective health investment and employee insurance program available to your organization.*

To find out whether your organization could benefit from an AED program, answer the following questions:

1. Are there barriers that would lead to a prolonged response time (more than five minutes)?
  - ❑ Multiple buildings
  - ❑ High-rise office towers
  - ❑ Heavy traffic
  - ❑ Long distance between EMS station and site
  - ❑ Large venue
  - ❑ Restricted areas that would make access difficult
  
2. Is there a high risk of someone having a cardiac arrest?
  - ❑ Large number of people: The more people in a given workplace, the more likely the occurrence of sudden cardiac arrest. Estimate about one cardiac arrest for every 100,000 life-years. To calculate the number of life-years, multiply the number of people at the location by their average age. For example, a workplace with 2,000 people and an average age of 40 years (80,000 life-years) can expect at least one incident of sudden cardiac arrest in the workplace each year.
  - ❑ Various people are at high risk for sudden cardiac arrest: some people are at higher risk for heart disease – for example, the elderly, people who have high levels of stress, and people who have made risk factors for heart disease such as smoking, lack of physical exercise, and poor eating habits.

Remember that **any** organization with a commitment to employee and client health, motivation, and support from administration can implement an AED program. However, some communities are not set up to support an AED program. The earlier links in the Chain of Survival, particularly an efficient EMS system, should be in place before adding the early defibrillation link through an AED program. Check with your local EMS representative to find out whether your EMS system will be able to support your program. If not, your organization may want to consider initiatives to lobby for improvements to your local EMS system.

## Getting started

Your first step should be to create an AED committee or task group for your organization. The committee can be any size, but should include motivated individuals who will work together to implement the AED program. Representatives from various levels of your organization should be involved.

Before making any major decisions about the program, the committee should consider the following:

- ❑ What are the health **priorities** of the organization's?
- ❑ What are the **expectations** of how the program will work within the organization?
- ❑ What **barriers** currently exist to implementation of an AED program?
- ❑ Is there internal **support** from the administration and/or key groups for an AED program?
- ❑ What **decision-making process** will be used to decide whether to purchase the AED(s)?
- ❑ How will the success of an AED program be **evaluated**?

Once these issues have been addressed, the AED committee should formulate a plan for the AED program. When planning an AED program, there are many things to consider. The more complete the program, the more effectively it should work. Although the purchase of an AED is essential to the program, all elements of an AED program must be in place if it is to be successful. The six essential elements of an effective AED program are:

**The AED**

**The Rescuers**

**The AED Program Coordinator or Medical Director**

**The EMS System**

**The Chain of Survival**

**Funding**



# 1 The AED

Decisions will be needed regarding the type and number of AED(s) to be purchased, where they will be located, and how they will be accessed and maintained.

- What type of AED(s) will be purchased? How many? Which location(s)?

The selection of the best AED model for your organization will depend on a variety of factors, such as budget, storage, and training. A variety of AED models are available on the market, for under \$1,500 price range. The list of AED manufacturers currently approved by Health Canada can be found on the Heart and Stroke Foundation website ([www.heartandstroke.ca](http://www.heartandstroke.ca)).

The number of AEDs to be purchased and where the AED(s) should be located depend on a number of factors such as the population you are serving (number of workers, clients, and others, and level of risk); how quickly EMS can get to all parts of your worksite(s) or community venues; and any barriers to accessing an AED, such as size and location of the site.

- How will the rescuers access the AED? Is the location secured?

Rescuers will need quick, easy access to the machine. In some locations, security may not be a problem, but for many locations, some form of security may be required. This security should not prevent rescuers, including non-staff members, from accessing it. For example, at an outdoor sports venue, an amateur coach or bystander may be the closest person at hand in the event of an emergency. The availability of an AED should be clearly marked, and plans should be in place for accessing the equipment.

- How much will the program cost?

The costs associated with an AED program are discussed in "Funding", page 13.

- How will the unit(s) be maintained?

Decisions should be made as to who will maintain the AED, and how often maintenance should be done. AEDs must be checked routinely to ensure they are always working properly. Malfunctions can happen because of poor maintenance or dead or low batteries. The manufacturer's instructions will indicate how often maintenance is required.

Depending on the size of the organization and the level of risk of the people involved, the AED may be needed once a month or once in five years. However, when defibrillation is needed, it is the person's only chance.

Without it, a person whose heart has stopped beating effectively is likely to die.

## **The Rescuers**

**2**

There are key decisions that will need to be made, such as who will be trained to use an AED, and how the training program will be set up. An AED by itself cannot help anyone - there must be rescuers trained to use it properly. Although traditionally the rescuers have been medical personnel, AEDs are so straightforward that almost anyone can learn to use them.

- Who and how many will be trained to use the AED(s)?

To decide who will benefit from training, consider who is most likely to be nearby and available to respond in an emergency. With enough resources, the entire community or staff could potentially be trained, and in many organizations, they are. However, for programs with limited resources, this may not be an option. If you cannot train everyone, you will need to decide how many trained individuals the program needs, and how these individuals are going to be selected. If you currently have people trained in first aid and CPR, they may be the most appropriate candidates. Keep in mind that the AED operator needs to be easily and quickly contacted in an emergency, and must be able to arrive at the scene with the AED in 5 minutes, but preferably sooner.

- How will the AED operator be contacted?

Information must be widely available as to how to quickly contact an AED-trained rescuer can be contacted in an emergency.

- Who is responsible for contacting EMS in an emergency?

Information should also be widely available about contacting EMS in an emergency. Who is assigned this responsibility depends on how the organization works. It could be the person who observes the incident, the AED coordinator or first aid attendant, a manager, a support staff member, or a bystander.

- How will people be trained to use the AED(s)?

Training helps to ensure that the AED is used properly to give the person the greatest chance of survival. Rescuer training should include CPR and AED. A demonstration or orientation to a specific AED is helpful, but it does not replace complete training for the proposed AED users.

The HSFC CPR and AED courses provide the training required for rescuers. A range of courses are available to meet the needs of rescuers dependant upon their role in an emergency. For further information, your provincial HSF Resuscitation Co-ordinator can help to arrange courses in CPR and /or AED at your location. Call your provincial Heart and Stroke office for more information at 1-888-HSF-INFO.

- After an AED is used, who will collect information about what happened and the outcome?

To improve your own program, it is important to collect information about every rescue attempt. The person in charge of first aid or health programs may be the most appropriate person to fulfill this role.

### **3** **The Program Coordinator or Medical Director**

Although not mandatory in some provinces, the Heart and Stroke Foundation recommends that **all** community and corporate AED programs have physician oversight or a designated AED Program Coordinator. Check with your provincial Resuscitation Coordinator or Director of EMS for the requirements in your province.

- Who will ensure that people trained to use the AED maintain their skills?

The AED Program Coordinator or Medical Director is a person who works or is involved in the facility or community where the AED Program is being set up. This person is the key contact with the vested interest in the program.

- What responsibilities will the Coordinator or Medical Director have?

Key responsibilities:

- ensuring that the AED program is coordinated with the local EMS system
- ensuring that rescuers are properly trained in CPR and that a system is in place so that their skills are maintained
- ensuring that the AED is properly maintained by appointing people to regularly check and maintain the AED unit
- following up after the AED has been used
- providing medical expertise and leadership
- serving as an advocate and spokesperson for the program and for early defibrillation
- notifying the provincial Heart and Stroke Foundation office about the new AED program if the Foundation maintains a provincial AED program central registry

## 4 **The EMS System**

The EMS system is responsible for delivering emergency care in your community and is a key element of your AED program. As a link in the Chain of Survival, early access to EMS plays a critical role in any medical emergency.

- ❑ Who will contact EMS to integrate the AED program into the local EMS service?

An AED program member should be assigned the responsibility of serving as liaison with the local EMS. In an emergency, EMS dispatchers need to be able to confirm with the emergency personnel that there is an AED on site. The EMS system will also be able to tell you of any local requirements for AED programs.

## 5 **The Chain of Survival**

To maximize its effectiveness, the AED program should be integrated with other heart health programs such as CPR training and education about healthy lifestyle choices.

The other important components of the Chain of Survival that can be incorporated into a program include:

**Healthy choices** – a health program that promotes healthy lifestyle choices such as being smoke-free, eating a balanced diet, and exercising regularly.

**Early recognition** - an information program about the signals of heart attack, sudden cardiac arrest, and stroke, and knowing when and how to get help.

**Early access** – ensuring that everyone knows when and how to access the EMS system by calling 911 or other local EMS number.

**Early CPR** – CPR training for everyone

To make your program effective, consider the following:

- ❑ Will an education program aimed at teaching the signals of heart attack, sudden cardiac arrest, and stroke be offered? Who will organize it, and how will people be encouraged to attend?
- ❑ Will an education program aimed at teaching awareness of the AED program and the local emergency number be offered?
- ❑ Will a CPR program be offered? Can it be offered to the entire organization? Who will do the training? When and how often will this be done?

## 6 Funding

Community and workplace AED programs have the potential to save lives. Before such programs can be implemented, the issue of funding has to be addressed. For some communities or corporations, funding may not be an issue. To help those in need of funding, this section provides basic information about how to secure funds for your community or workplace AED program.

- How much funding will your program require?

List all costs in your budget, including:

- initial cost of AED device(s)
- number of locations to be serviced
- other equipment costs (replacement adhesive pads, batteries, and accessory kits)
- annual maintenance and insurance costs
- annual AED training costs
- annual salary costs of program personnel (if any)
- event documentation costs
- quality assurance costs
- cost of any other community/workplace initiatives such as CPR/AED training, first aid training, and heart health programs

- What are the potential funding sources?

Some community/workplace AED programs receive funding from local emergency services. Municipal governments and local health care agencies are two other common funding sources. Additional funding is often needed to meet program costs. Sources might include:

- government funding and/or grants
- local corporations and industries
- local civic organizations (e.g., Lions Club, Kiwanis Club, or the Legion)
- private foundations
- public charities
- local fund-raising events

### **What's next?**

With all six elements in place and funding secured, the final step is to implement the AED program. Congratulations on making a commitment to the health and wellbeing of your community or workplace, workers, and their families!

You may want to take advantage of this commitment by publicizing your AED program both inside and outside of your organization. Examples of how you can publicize your program include a media conference and/or release, a newsletter, and/or e-mail to members/employees of your organization.

If you would like some assistance with this aspect of your program, contact the Heart and Stroke Foundation at 1-888-HSF-INFO. We may have suggestions or resources that will assist you in developing your program and supporting your commitment to saving lives.

**We wish you great success in setting up your AED program.**