

Automated External Defibrillators (AEDs)

We are hearing more and more about Automated External Defibrillators (AEDs), usually because they were used to save a life, or when a unit was unavailable and the incident ended in tragedy. Lawsuits have even been filed against those that did not have a unit available, and a victim of sudden cardiac arrest (SCA) died.

AEDs can and have saved lives of victims of sudden cardiac arrest, or SCA, since SCA quickly leads to death. According to the American Heart Association, SCA leads to death resulting from the sudden, abrupt loss of heart function in a person who may or may not have diagnosed heart disease.

Sixty-one million Americans have cardiovascular disease, resulting in approximately 1 million deaths per year. One-third of these deaths (300,000-400,000) are due to cardiac arrest, the sudden and unexpected loss of heart function. Survival rates for out-of-hospital cardiac arrest are only 1 to 5 percent. This translates into over 700 lives lost every day. Death typically occurs shortly after symptoms appear.

How the heart works

The heart has four chambers that must beat in an organized rhythm in order to pump the blood throughout the body properly. This rhythm is governed by electrical impulses that are generated by specialized cells in the heart. When these impulses lose their rhythm, the chambers of the heart beat in a rapid, unsynchronized manner. When this happens, blood is not pumped effectively. One such erratic rhythm is known as ventricular fibrillation, or v-fib (VF). This is the most common cause of cardiac arrest.

Another condition which can be corrected is ventricular tachycardia, or v-tach (VT). With this condition, the heart muscles “quiver” instead of beating normally. Collapse and sudden death will follow either condition unless medical help is provided immediately.

When someone becomes a victim of SCA, they lose consciousness, normal breathing stops, and pulse and blood pressure are lost. A heart attack is a different condition, with its own symptoms, and is usually caused by a lack of blood flow to the heart muscles. But heart attacks can lead to SCA.

What is defibrillation?

Defibrillation refers to delivering an electric shock to the heart to restore a normal heartbeat. The electrical shock causes the heart to “reset” its electrical impulses, which can often return the muscles to a normal function. These shocks can be delivered by an AED. One important factor in having an AED on location in the workplace is time. Brain death and permanent death start to occur in just four to six minutes after someone experiences a cardiac arrest.

Survival

Immediate treatment of an SCA event can result in greater than a 90 percent survival rate. A victim's chances of survival decrease about 10 percent with each passing minute. A quick emergency response, including cardio-pulmonary resuscitation (CPR) and an AED, is essential for workplaces that are more than ten minutes away from the nearest medical help.

In June 1999, Chicago's O'Hare and Midway Airports installed AEDs to be able to quickly respond to cardiac arrest. In the first 10 months, 14 cardiac arrests occurred, and 9 of the 14 victims (64 percent) survived. The quicker the help, the greater the chances of survival.

Chain of survival

In the workplace, an AED is only one link in a chain of survival. The links in the chain of survival are as follows:

- Early access—To emergency medical services. This includes someone trained in emergency response to assess the scene, assess the victim's responsiveness, and activate an emergency plan.
- Early CPR—CPR is a holding action that buys time until more skilled or extensive medical services can be accessed.
- Early defibrillation—With an AED. This is the primary factor in successful resuscitation from sudden cardiac arrest.
- Early advanced cardiac care—This is the final critical link. This is where stabilizing care and transport are provided.

How AEDs work

An AED is a small, portable, battery-operated device capable of detecting life-threatening conditions of the heart that can be corrected with defibrillation. Once on the scene, the first thing is to turn the AED on. This is usually done with the press of a button. The unit will begin to prompt you through the required steps. The victim's chest is bared, and any visible jewelry, piercings, or medicine patches are removed.

The unit comes with a set of pads that are applied to a victim's bare chest via the adhesive that is exposed by peeling off a covering of paper. There are graphics on the pads to help you with correct placement. After the pads are in place, the AED will analyze the victim to determine if a shock should be administered. If so, the unit will instruct you to ensure that no one is touching the victim. Anyone who is touching the victim will also receive a shock. When the unit indicates, you deliver a shock with the press of a button.

From there, the unit will analyze the victim's heart performance again and prompt you through more required steps, which may include continuing CPR.

The strength of the shock is automatic, so you do not have to guess how much to deliver. You don't even have to determine whether a shock is needed; the unit will tell you. If the unit does not detect fibrillation, it cannot deliver a shock, so it cannot be used in an unsafe manner.

Training

The training required for using an AED is minimal and easily obtained. Associations such as the American Red Cross offer training. The training is normally offered in conjunction with CPR training, another link in the chain.

If you think that operating an AED is difficult, a study indicated that untrained sixth graders fared almost as well as trained professionals in using AEDs. This is by design. The easier it is to use the units, the more people will be comfortable with using them, and the opportunity for saving lives increases.

Good Samaritan Protections

When AEDs first came on the scene, many thought that there would be liabilities involved. Currently, the only cases that have stemmed from AED use are against those who did not have them. In 2000, the Cardiac Arrest Survival Act was signed into law in November 2000, giving immunity from civil liability for any harm resulting from the use of an AED by a layperson. If a person's heart is in v-fib, the only method of survival is defibrillation, which makes the victim's death virtually imminent if nothing is done. With this in mind, some workplaces are beginning to feel less safe without an AED.

The workplace

In 1999 and 2000, 815 out of 6,339 (13 percent) workplace fatalities reported to OSHA were due to sudden cardiac arrest. Work factors that may aggravate or contribute to cardiovascular disease are carbon monoxide, carbon disulfide, halogenated hydrocarbons, smoking, extreme heat or cold, stress, and shift work. Electrical hazards may produce cardiac arrest (ventricular fibrillation). Exposure to noise, lead, or arsenic may produce high blood pressure, increasing the risk for heart disease.

About 400 workplace deaths from cardiac arrest are reported to OSHA annually. Assuming an average time to defibrillation of 5 minutes would produce a 40 percent survival rate, 160 lives per year could be saved. Employers should consider use of AEDs at their worksites to reduce the time to defibrillation with the goal of improving survival.

In December 2001, OSHA published their views on AEDs in the workplace through a technical information bulletin, a fact card, and a news release in which OSHA Administrator John L. Henshaw stated that "AEDs are easy to use and can make the

critical difference in reviving individuals who suffer a cardiac crisis.” An employee at the Department of Labor collapsed and emergency personnel used an AED to resuscitate the victim, who recovered after heart surgery.

The workplace is filled with employees from the baby-boomer era, which means that they are getting up there in years. Many of those employees, who are in decision-making roles in their companies, are learning that they could be sudden cardiac arrest victims, and this may be promoting the increase in workplace AED placement. When you factor in the low cost (under \$3000); the lack of liability; the ease of use; and the all-around small payout in time, effort, and cost for an AED, it becomes easy to see why their popularity is increasing. This popularity could prove fruitful; we could use more headlines that tell stories of survival.