Sudden Cardiac Arrest

Sudden Cardiac Arrest (SCA) is an indiscriminate killer with a dismal survival rate of between 5 and 7%. While half the victims are elderly and over the age of 67, SCA can strike younger victims, including those appearing to be in excellent health, athletes and even young children. It is the leading cause of death worldwide and is responsible for over 150,000 deaths a year in the United Kingdom alone.

SCA occurs when the electrical system of the heart stops working effectively—the heart unexpectedly stops pumping, when this occurs, blood stops flowing to the heart, brain and other vital organs and within seconds, the victim collapses and becomes completely unresponsive. Death will occur if not treated within the first few minutes.

The heart has its own electrical system that controls the rhythm of the heartbeat, defects within the electrical system can cause abnormal rhythms of the heart commonly called arrhythmias. Arrhythmias cause the heart to beat irregularly or stop altogether, the most common of which is ventricular fibrillation (VF).

SCA is not the same as a heart attack (acute myocardial infarction or AMI). A heart attack is caused by a blockage in an artery that supplies blood to the heart. The affected heart muscle then begins to die due to lack of oxygen. Symptoms include central crushing chest pain, often radiating to arms and jaw. The patient, however usually remains awake and alert.

A heart attack can degenerate into VF when the victim becomes totally unresponsive.

The Resuscitation Guidelines 2010 state that the optimum treatment for SCA or VF is immediate good quality cardio pulmonary resuscitation (CPR) and electrical 'defibrillation' delivered using an Automated External Defibrillator (AED).

Several recent studies have also indicated that approximately 50% of SCA victims at the time of the first heart rhythm analysis have deteriorated into asystole or a non-shockable rhythm, where the only effective treatment becomes good quality CPR. This can convert the heart back to VF to enable the AED to deliver the essential defibrillatory shock.
Quality of CPR

Research into CPR spans nearly half a century since the technique was first developed in 1960. We have however in the past few years come to better understand how much the quality of CPR matters and further the importance of CPR in the context of growing access to AEDs. Recent studies have focused on both the importance of CPR as a front-line treatment of SCA, as well as the difficulties in administering it effectively for any length of time. The Resuscitation Guidelines 2010 clearly highlight the critical importance of high-quality uninterrupted chest compressions on the survival of the sudden cardiac arrest patient.

When a rescuer attempts to deliver CPR, interruptions to chest compressions must be minimised. As blood flow through the body decreases significantly when compressions are stopped. On resuming chest compressions, several compressions are necessary before the coronary flow recovers to its previous level. Recent evidence indicates that unnecessary interruptions to chest compressions occur frequently both in and out of hospital.

What does CPR do?

1. CPR provides a small but critical amount of blood to the heart and the brain. CPR can prolong the time VF is present and increases the likelihood that a shock will terminate VF and allow the heart to resume an effective rhythm and effective systemic perfusion.

2. CPR is especially important if defibrillation isn’t delivered for four or more minutes after a collapse. By that time, the heart has become distended (full of blood) because it has stopped pumping, yet the veins continue delivering blood to the heart. CPR helps evacuate this blood, which significantly increases the chance defibrillation will be effective.

3. Even after the heart is “stunned,” it still may not pump blood effectively in the first few minutes after successful defibrillation. Therefore, CPR may be needed several minutes following defibrillation to help the heart along. CPR helps the shock work.

4. High-quality CPR can increase coronary perfusion from nothing to 15-30 percent of what is typical for a person at rest.

The Importance of CPR

All victims of SCA need immediate CPR. The principal reason to do CPR is that it helps pump oxygenated blood around the body to protect the vital organs in particular the heart. The 2010 Resuscitation Guidelines elevated CPR as an essential part of the rescue, stating that CPR is critical if an AED advises “NO SHOCK” and in the event a shock is advised, it must be accompanied by good quality CPR. The 2010 Guidelines reinforced the changes made in 2005 to the rescue and AED protocols. There was unanimous support for increased emphasis on ensuring that rescuers deliver high-quality CPR, the 2010 Guidelines state that rescuers need to provide:

1. 100 - 120 beats per minute of chest compressions at a depth of between 5 - 6 centimetres.

2. Allow complete chest recoil after each compression.

3. Minimise interruptions in chest compressions.
A striking finding was the contrast of data that showed the importance of immediate high-quality CPR in increasing SCA survival rates versus data that showed few victims of SCA actually receive CPR and even fewer receive high-quality CPR. In response to these findings, the 2010 Guidelines emphasize the delivery of good quality CPR and made these changes to:

- Simplify CPR instruction.
- Increase the number of chest compressions delivered per minute over the entire rescue.
- Reduce interruptions in chest compressions during CPR.
- Highlight the need to ‘Push hard! Push fast! Push deep!’.
- Dedicate more time to CPR.
- Dedicate less time to analysing, assessing and ventilating.
- Deliver more chest compressions with fewer interruptions.
- Deliver a rate of compressions between 100 - 120 per minute.
- Deliver a depth of chest compressions between 5 - 6cm.

In all, the 2010 Guidelines reinforce that continuous chest compressions keep perfusion up so the heart, brain and other vital organs get more oxygenated blood. This together with defibrillation will increase the chance of return of spontaneous circulation (ROSC).

The Importance of AEDs

So what would the likely scenario be if someone at your workplace collapses due to SCA and is unresponsive? An AED is found nearby on the premises and electrodes have been properly attached. The AED has prompted “DON’T TOUCH PATIENT - ANALYSING”. An electrocardiogram (ECG) analysis of the victim’s heart rhythm is in progress. What is the probability that the AED will advise shocking the victim?

Some AED manufacturers would have you believe that a defibrillatory shock is the only essential treatment when it comes to SCA. Just place the electrode pads, deliver a shock and the victim will sit up and thank you for saving his life. If only it were so simple.

Many think defibrillation actually restarts the heart, not so; the fibrillating heart requires the shock to stun the heart, briefly stopping the heart’s chaotic electrical activity that led to VF and SCA. Once defibrillated, if the heart is still viable, normal electrical activity may resume typically after a significant period of time when good quality CPR has been performed, thus contributing to a successful outcome.

The provision of AEDs in the work place and wider community has been rapidly increasing over the last few years and it is estimated that there are over 10,000 deployed across the UK. The technology used in AEDs has made them easy to use with a minimal amount of training. The real issue however is whether or not the AED will advise a shock at the time when you are going to use it and equally as important if you are able to deliver the high quality CPR required for a prolonged period of time.

Since 2003 ZOLL Medical has manufactured an AED called the ZOLL AED Plus®. This device is unique, in so much that it not only delivers the defibrillatory shock if required, but it also fully supports the rescuers attempt to deliver good quality CPR utilising a system known as Real CPR Help®.
This has now become a standard feature across the entire range of all ZOLL defibrillators. Real CPR Help provides the rescuer with real-time feedback to optimise the patient's opportunity for ROSC.

Real CPR Help is constantly looking at the delivery of chest compressions and will assist all rescuers with the following feedback and prompts to help deliver effective CPR.

**Audio/Message Prompts**

Voice and message prompts help the rescuer achieve optimal CPR compressions. Feedback such as “PUSH HARDER” helps accomplish quality compressions quickly, resulting in a reinforcing message, “GOOD COMPRESSIONS”. To minimise CPR idle time, “CONTINUE CPR” is another important reminder.

**Compression Depth Indicator**

The AED Plus® monitors your delivery of chest compressions and with a simple bar gauge indicator on the screen allows you to consistently achieve the Resuscitation Council’s recommended depth of 5 - 6cm.

**Compression Rate Indicator**

The AED Plus® allows the user to easily achieve the compression rate of at least 100 compressions per minute through a dynamic adaptive metronome that is easy to follow.

A recent study published in the Annals of Emergency Medicine produced some interesting results supporting the use of ZOLL's Real CPR Help technology. The study was carried out in Arizona over a period of 18 months involving approximately 500 cardiac arrest patients.

The findings clearly demonstrate that a person is 2.72 times more likely to survive a cardiac arrest if well-trained responders use a ZOLL defibrillator with Real CPR Help\(^1\).

Concluding that there is a positive correlation between good quality CPR and cardiac arrest survival. It also highlights that whilst defibrillation plays an important role, it is only part of the overall chain of survival.


For more information contact a member of the ZOLL team on:

t:  01928 595 160

e:  info-uk@zoll.com

Or for the latest news, photos and videos from ZOLL, check out our social media sites:

ZOLL AEDS  
@zollaed  
zollmedical