The Importance of CPR (FAQ)

According to the writers of the AHA Guidelines, how important is CPR and how well do rescuers perform it?

It is very important, but is often not done well. Here is a relevant quotation:

> A striking finding … was the contrast of data that showed the **critical role of early, high-quality CPR** in increasing rates of survival from cardiac arrest with data that showed that few victims of cardiac arrest receive CPR, and **even fewer receive high-quality CPR.**
>
> (*AHA Guidelines for CPR and ECC*, pg. IV-206. Emphasis added.)

What can be done to improve the outcomes of our rescues?

All of them agreed that Cardio-Pulmonary Resuscitation (CPR) is what is needed most. Again, here is a relevant quotation:

> There was unanimous support for increased emphasis on ensuring that rescuers deliver ***high-quality CPR***: rescuers need to provide an **adequate number and depth of compressions**, allow complete chest recoil after each compression, and minimize interruptions in chest compressions.
>
> (*AHA Guidelines for CPR and ECC*, pg. IV-206. Emphasis added.)

When no shock is advised by the AED, how important is CPR?

In such situations, only good CPR can help resuscitate the victim.

> Victims of cardiac arrest need immediate CPR. CPR provides a small but critical amount of blood flow to the heart and brain. **CPR prolongs the time VF is present and increases the likelihood that a shock will terminate VF** (defibrillate the heart) and allow the heart to resume an effective rhythm and effective systemic perfusion. CPR is especially important if a shock is not delivered for 4 …or more minutes after collapse.
>
> (*AHA Guidelines for CPR and ECC*, pg. IV-19. Emphasis added.)

When a shock is advised by the AED, is CPR less important?

No! Definitely not.

> Defibrillation does not “restart” the heart; defibrillation “stuns” the heart, briefly stopping VF and other cardiac electrical activity. If the heart is still viable, its normal pacemakers may then resume firing and produce an effective ECG rhythm that may ultimately produce adequate blood flow.
>
> In the first few minutes after successful defibrillation, asystole or bradycardia may be present and the heart may pump ineffectively. In one recent study of VF SCA, only 25% to 40% of victims demonstrated an organized rhythm 60 seconds after shock delivery; it is likely that even fewer had effective perfusion at that point. **Therefore, CPR may be needed for several minutes following defibrillation until adequate perfusion is present.**
>
> (*AHA Guidelines for CPR and ECC*, pg. IV-19. Emphasis added.)

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Part 4: Adult Basic Life Support

Basic life support (BLS) includes recognition of signs of sudden cardiac arrest (SCA), heart attack, stroke, and foreign-body airway obstruction (FBAO); cardiopulmonary resuscitation (CPR); and defibrillation with an automated external defibrillator (AED). This section summarizes BLS guidelines for lay rescuers and healthcare providers.

Introduction

As noted in Part 3: "Overview of CPR," SCA is a leading cause of death in the United States and Canada.[1–3] At the first analysis of heart rhythm, about 40% of victims of out-of-hospital SCA demonstrate ventricular fibrillation (VF).[3–5] VF is characterized by chaotic rapid depolarizations and repolarizations that cause the heart to quiver so that it is unable to pump blood effectively.[6] It is likely that an even larger number of SCA victims have VF or rapid ventricular tachycardia (VT) at the time of collapse, but by the time of first rhythm analysis the rhythm has deteriorated to asystole.[7]

Many SCA victims can survive if bystanders act immediately while VF is still present, but successful resuscitation is unlikely once the rhythm deteriorates to asystole.[8] Treatment for VF SCA is immediate bystander CPR plus delivery of a shock with a defibrillator. The mechanism of cardiac arrest in victims of trauma, drug overdose, drowning, and in many children is asphyxia. CPR with both compressions and rescue breaths is critical for resuscitation of these victims.

The American Heart Association uses 4 links in a chain (the "Chain of Survival") to illustrate the important time-sensitive actions for victims of VF SCA (Figure 1). Three and possibly all 4 of these links are also relevant for victims of asphyxial arrest.[9] These links are

- Early recognition of the emergency and activation of the emergency medical services (EMS) or local emergency response system: "phone 911."[10,11]
- Early bystander CPR: immediate CPR can double or triple the victim's chance of survival from VF SCA.[8,12–14]
- Early delivery of a shock with a defibrillator: CPR plus defibrillation within 3 to 5 minutes of collapse can produce survival rates as high as 49% to 75%.[15–23]
- Early advanced life support followed by postresuscitation care delivered by healthcare providers.

Bystanders can perform 3 of the 4 links in the Chain of Survival. When bystanders recognize the emergency and activate the EMS system, they ensure that basic and advanced life support providers are dispatched to the site of the emergency. In many communities the time interval from EMS call to EMS arrival is 7 to 8 minutes or longer.[24] This means that in the first minutes after collapse the victim's chance of survival is in the hands of bystanders.

Shortening the EMS response interval increases survival from SCA, but the effect is minimal once the EMS response interval (from the time of EMS call until arrival) exceeds 5 to 6 minutes (LOE 3).[25–31] EMS systems should evaluate their protocols for cardiac arrest patients and try to shorten response intervals when improvements are feasible and resources are available (Class I). Each EMS system should measure the rate of survival to hospital discharge for victims of VF SCA and use these measurements to document the impact of changes in procedures (Class IIa).[32–35]

Victims of cardiac arrest need immediate CPR. CPR provides a small but critical amount of blood flow to the heart and brain. CPR prolongs the time VF is present and increases the likelihood that a shock will terminate VF (defibrillate the heart) and allow the heart to resume an effective rhythm and effective systemic perfusion. CPR is especially important if a shock is not delivered for 4 (LOE 4),[36] 5 (LOE 2),[37] or more minutes after collapse. Defibrillation does not "restart" the heart; defibrillation "stuns" the heart, briefly stopping VF and other cardiac electrical activity. If the heart is still viable, its normal pacemakers may then resume firing and produce an effective ECG rhythm that may ultimately produce adequate blood flow.

In the first few minutes after successful defibrillation, asystole or bradycardia may be present and the heart may pump ineffectively. In one recent study of VF SCA, only 25% to 40% of victims demonstrated an organized rhythm 60 seconds after shock delivery; it is likely that even fewer had effective perfusion at that point.[38] Therefore, CPR may be needed for several minutes following defibrillation until adequate perfusion is present.[39]

Lay rescuers can be trained to use a computerized device called an AED to analyze the victim's rhythm and deliver a shock if the victim has VF or rapid VT. The AED uses audio and visual prompts to guide the rescuer. It analyzes the victim's rhythm and informs the rescuer if a shock is needed. AEDs are extremely accurate and will deliver a shock only when VF (or its precursor, rapid VT) is present.[40] AED function and operation are discussed in Part 5: "Electrical Therapies: Automated External Defibrillators, Defibrillation, Cardioversion, and Pacing."

Successful rescuer actions at the scene of an SCA are time critical. Several studies have shown the beneficial effects of immediate CPR and the detrimental impact of delays in defibrillation on survival from SCA. For every minute without CPR, survival from witnessed VF SCA decreases 7% to 10%.[8] When bystander CPR is provided, the decrease in survival is more gradual and averages 3% to 4% per minute from collapse to defibrillation.[8,12] CPR has been shown to double[8,12] or triple[41] survival from witnessed SCA at many intervals to defibrillation.[42]

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