



# CPR/AED for Professional Rescuers and Health Care Providers

**HANDBOOK**



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## The Cardiac Chain of Survival

The four links in the Cardiac Chain of Survival are:

- **Early recognition and early access to the EMS system.** The sooner someone calls 9-1-1 or the local emergency number, the sooner EMS personnel will take over.
- **Early CPR.** CPR helps supply oxygen to the brain and other vital organs. This helps keep the victim alive until an AED is used or more advanced medical care is provided.
- **Early defibrillation.** An electrical shock, called defibrillation, may help restore an effective heart rhythm.
- **Early more advanced medical care.** EMS personnel provide more advanced medical care and transport the victim to a hospital.

For each minute CPR and defibrillation are delayed, the victim's chance for survival is reduced by about 10 percent.

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## CARDIAC ARREST

Cardiac arrest is a life-threatening emergency.

### Causes of Cardiac Arrest

- Heart attack
- Electrocutation
- Respiratory arrest
- Drowning
- Other conditions

Causes of cardiac arrest in children and infants include:

- Airway and breathing problems.
- Traumatic injuries or accidents (e.g., motor-vehicle collision, drowning, electrocution or poisoning).
- A hard blow to the chest.
- Congenital heart disease.
- Sudden infant death syndrome (SIDS).

### Signs of Cardiac Arrest

- Unconsciousness
- No breathing
- No pulse

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## CPR

Delivered in cycles of chest compressions and ventilations, CPR circulates blood that contains oxygen to the vital organs of a person whose heart and breathing have stopped. Summoning more advanced medical personnel

immediately is critical for the victim's survival. If an AED is available, use it in combination with CPR and according to local protocols until more advanced medical personnel take over.

If at any time you notice an obvious sign of life, such as breathing, stop CPR and monitor the victim's condition.




## Chest Compressions

Effective chest compressions are essential for high-quality CPR. They circulate blood to the victim's brain and other vital organs.

The effectiveness of compressions can be increased if (**Table 2**):

- The victim is on a firm, flat surface.
- Compressions are the proper depth.
- For an adult or a child, you keep your arms as straight as possible and your shoulders directly over your hands. For an infant, you position your hand over your fingers.
- The chest fully recoils (comes all the way back up) after each compression.
- The compression rate is at least 100 per minute.
- CPR is performed without interruption. If CPR must be interrupted, do so for *only* a few seconds.

**Table 2: Summary of Techniques for Adult, Child and Infant CPR**

	Adult	Child	Infant
			
<b>Hand position</b>	Heel of one hand in center of chest (on lower half of sternum) with other hand on top		One hand on forehead and two or three fingers in center of chest (on lower half of sternum, just below nipple line)
<b>Compression depth</b>	At least 2 inches	About 2 inches	About 1½ inches
<b>Rate</b>	At least 100 compressions per minute		
<b>Ventilations</b>	Until the chest clearly rises (about 1 second per ventilation)		
<b>Cycles (one rescuer)</b>	30 chest compressions and 2 ventilations		
<b>Cycles (two rescuers)</b>	30 chest compressions and 2 ventilations	15 chest compressions and 2 ventilations	

## Two-Rescuer CPR

When an additional rescuer is available, perform two-rescuer CPR. One rescuer gives ventilations and the other performs chest compressions.



## AEDs

AEDs are portable electronic devices that analyze the heart's rhythm and can provide defibrillation, an electrical shock that may help the heart to re-establish an effective rhythm (**Figure 10**).

### Using an AED—Adult

When cardiac arrest occurs, use an AED as soon as it is ready to use. If CPR is in progress, continue until the AED is turned on, the AED pads are applied and the AED is ready to analyze the heart rhythm.

### Using an AED—Child or Infant

AEDs equipped with pediatric AED pads are capable of delivering lower levels of energy appropriate for infants and children up to 8 years old or weighing less than 55 pounds. Use pediatric AED pads and/or equipment, if available. If pediatric-specific equipment is not available, an AED designed for adults can be used on children and infants. Always follow local protocols, medical direction and the manufacturer's instructions.

## AED Precautions

When operating an AED, also follow these general precautions:

- Do *not* use alcohol to wipe the victim's chest dry. Alcohol is flammable.
- Do *not* touch the victim while the AED is analyzing. Touching or moving the victim may affect analysis.
- Before shocking a victim with an AED, make sure that *no one* is touching or is in contact with the victim or any resuscitation equipment.
- Do *not* touch the victim while the device is defibrillating. You or someone else could be shocked.
- Do *not* defibrillate someone when around flammable or combustible materials, such as gasoline or free-flowing oxygen.
- Do *not* use an AED in a moving vehicle. Movement may affect the analysis.
- Do *not* use an AED on a victim wearing a nitroglycerin patch or other medical patch on the chest. With a gloved hand, remove *any* patches from the chest before attaching the device. Never place AED pads directly on top of medication patches.
- Do *not* use a mobile phone or radio within 6 feet of the AED. Electromagnetic and infrared interference generated by radio signals can disrupt analysis.

## AEDs Around Water

If the victim is in water:

- Remove the victim from the water before defibrillation. A shock delivered in water could harm rescuers or bystanders.
- Be sure there are no puddles of water around you, the victim or the AED.
- Remove wet clothing to place the AED pads properly, if necessary.
- Dry the victim's chest and attach the AED pads.

If it is raining, take steps to make sure that the victim is as dry as possible and sheltered from the rain. Ensure that the victim's chest is wiped dry. Do not delay defibrillation when taking steps to create a dry environment. AEDs are very safe, even in rain and snow, when all precautions and manufacturer's operating instructions are followed. Avoid getting the AED or AED pads wet.

## Pacemakers and Implantable Cardioverter-Defibrillators

Pacemakers are small implantable devices sometimes located in the area below the right collarbone, though they can be placed elsewhere (**Figure 11**). An implantable cardioverter-defibrillator (ICD) is a miniature version of an AED.

- If the implanted device is visible or you know that the victim has one, do not place the AED pads directly over the device. This may interfere with the delivery of the shock. Adjust AED pad placement if necessary and continue to follow the AED instructions.
- If you are not sure whether the victim has an implanted device, use the AED as needed. It will not harm the victim or the rescuer.
- Follow any special precautions associated with ICDs, but do not delay performing CPR and using an AED.

## Hypothermia

Hypothermia is a life-threatening condition in which the entire body cools because its ability to keep warm fails. Some people who have experienced hypothermia have been resuscitated successfully even after prolonged exposure to the cold.

### Caring for a Victim with Hypothermia

If the victim is not breathing and does not have a pulse:

- Begin CPR until an AED becomes available.
- Follow local protocols regarding whether you should use an AED in this situation.



Courtesy of Ted Crites

## GIVING VENTILATIONS USING A BAG-VALVE-MASK RESUSCITATOR—TWO RESCUERS

**Note:** Size-up the scene for safety, then perform a primary assessment. Prepare the bag-valve-mask resuscitator (BVM) for use during the primary assessment. Always select the properly sized BVM for the victim.

**If the victim is not breathing but has a pulse:**

### 1 RESCUER 1 POSITIONS THE MASK OVER THE VICTIM'S MOUTH AND NOSE

- Kneel behind the victim's head.

### 2 RESCUER 1 SEALS THE MASK



### 3 RESCUER 1 OPENS THE AIRWAY

- Place the thumbs along each side of the mask, using the elbows for support.
- Slide the fingers behind the angles of the victim's jawbone.
- Push down on the mask with the thumbs, lift the jaw and tilt the head back.



### 4 RESCUER 2 GIVES VENTILATIONS

- Squeeze the bag slowly with both hands.
- For an adult, give **1** ventilation about every **5** seconds.
- For a child or an infant, give **1** ventilation about every **3** seconds.
- Each ventilation should last about **1** second and make the chest clearly rise. The chest should fall before the next ventilation is given.



**5 RESCUER 2 RECHECKS FOR BREATHING AND A PULSE ABOUT EVERY 2 MINUTES**

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- Remove the mask, then look, listen and feel for breathing and check for a pulse for no more than **10** seconds.

**6 PROVIDE CARE AS NEEDED**

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- If unconscious but breathing, place in a recovery position.
- If unconscious and no breathing but there is a pulse, continue giving ventilations.
- If unconscious and no breathing or pulse, begin CPR.
- If the chest does not clearly rise, provide care for an unconscious choking victim.