



New Concepts of Cardiopulmonary Resuscitation for the Lay Public

Continuous-Chest-Compression CPR

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More than 300 000 persons die of sudden cardiac arrest each year. A patient in cardiac arrest has very little chance of survival unless you, the bystander, take immediate action to sustain him or her until the paramedics arrive.

What Is Cardiac Arrest?

Cardiac arrest is a condition in which the heart abruptly stops pumping blood. In many cases, the heart suddenly goes from a regular heartbeat to a random twitching, called ventricular fibrillation. When the heart is quivering like that, blood is not moved through the body, and the patient passes out.

How Do I Recognize a Cardiac Arrest?

Do not waste time trying to determine whether the victim has a pulse. First, you should address the person in a loud voice. If there is no response, shake the person to check if he or she is unconscious. If there is no response, assess the breathing: Is it normal or abnormal? Abnormal breathing means

either no breathing at all or intermittent gasping. If you witness a person suddenly collapse for no apparent reason and that person is unresponsive and not breathing normally, you should treat this as a cardiac arrest.

What Should I Do?

First, notify the paramedics. In the United States, you can do this by calling 9-1-1 (the Table and Figure). When you call, many dispatchers ask you if you know continuous-chest-compression or chest compression-alone cardiopulmonary resuscitation (CPR) and, if not, will give you instructions over the phone. Bystanders should immediately start chest compressions and continue until the paramedics arrive (the Table and Figure).

Although very important, chest compressions alone will not restore a heartbeat. A fibrillating heart requires an electric shock from a defibrillator to enable it to resume a normal heart beat. However, until then, chest compressions are the only means to move blood to the patient's brain, heart, and other organs. Without chest compressions,

a fibrillating heart will use up its energy supply and, by the time the paramedics arrive, may no longer be able to respond to a defibrillation shock. As a result, the person will not survive.

If an automated external defibrillator is nearby, have someone look for it and take it to the victim. Do not delay or interrupt chest compressions in the meantime. Attach the automated external defibrillator to the patient, switch it on, and follow the machine's voice instructions (the Table). Instructions from modern automated external defibrillators are so simple that almost everyone can use them without prior training.

Can I Harm the Patient?

It is not dangerous to perform chest compressions even if the heart is still beating. You cannot make a patient any worse than he or she already is. Yes, you may break ribs, but the alternative is almost certainly death. The patient's medical history is not important; conditions such as a pacemaker or bypass surgery should not concern you as a bystander.

The information contained in this *Circulation* Cardiology Patient Page is not a substitute for medical advice, and the American Heart Association recommends consultation with your doctor or healthcare professional.

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Table. Be a Lifesaver With Continuous-Chest-Compression CPR: Safe, Easy, and No Mouth-to-Mouth Rescue Breathing

If you witness a sudden, unexpected collapse of an individual with abnormal breathing (either no breathing or gasping), follow these simple steps:

1. Direct someone to call 9-1-1 or make the call yourself (the Figure).
2. Position the patient on the floor, face up. Place the heel of one hand on the center of the chest with the heel of the other hand on top of the first (the Figure). Lock your elbows so that your arms are straight. Position your shoulders directly above the center of the patient's chest and fall so that the weight of your upper body compresses the patient's chest. Perform fast, forceful chest compressions at about 100/min, compressing the chest 1.5 to 2 in. Lift hands slightly after each compression to allow the chest to recoil. If another bystander is present, take turns performing chest compressions until the paramedics arrive. If by yourself, rest briefly when you tire.
3. If an automated external defibrillator is available, open the patient's shirt and attach the pads to the skin in the positions indicated on the automated external defibrillator and follow the machine's voice instructions. Keep interruptions of chest compressions to a minimum.

For further information and a Web demonstration of continuous-chest-compression CPR, go to <http://www.heart.arizona.edu>.

Why Is Continuous-Chest-Compression CPR Better for Cardiac Arrest?

Presently, only 1 in 4 patients in cardiac arrest receives bystander CPR. Studies have found that bystanders are more willing to start resuscitation efforts if mouth-to-mouth ventilations are not required. In addition, continuous-chest-compression CPR is less complex and therefore easier to learn and remember. It is important to realize that, even when chest compressions are performed continuously and properly on a person in cardiac arrest, the blood flow

they generate is so weak that any interruption in chest compressions, even for breathing, lowers the chances of survival.

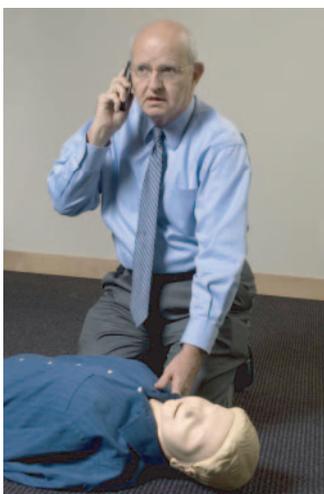
When Should I Stop?

The simple answer: When either the patient or the paramedics tell you to stop or you are too tired to continue. However, do not stop pressing on the chest if the patient begins to gasp, opens his or her eyes, or moves somewhat, because these are only signs that you are doing a proper job, not that the patient has recovered.

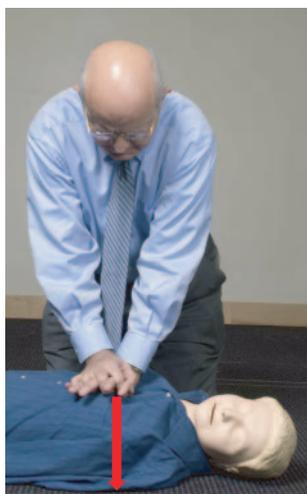
Why Is So-Called "Rescue Breathing" Not Recommended for Cardiac Arrest?

In the past, it was recommended that bystanders perform CPR that alternates chest compressions with mouth-to-mouth ventilations. Research has shown that traditional CPR is not the best way to treat cardiac arrest. Unlike respiratory arrest, during which the victim does not get enough air and the heart eventually stops because it no longer receives oxygen, a person who collapses because of sudden cardiac arrest was usually breathing normally just seconds before. In this case, there is no point in delaying the start of chest compression by trying to deliver "rescue breaths" to a person whose blood and lungs are full of oxygen. Studies found that the blood of a cardiac arrest victim contains enough oxygen to sustain him or her for several minutes.

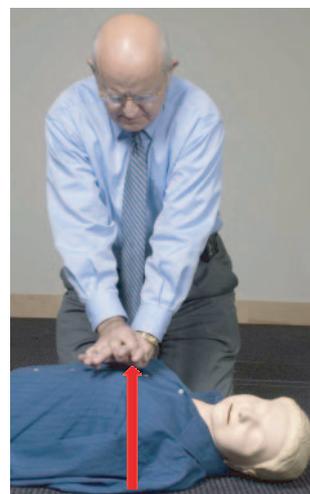
More important, mouth-to-mouth breathing takes valuable time away from urgently needed continuous-chest-compressions. Research has shown that lay individuals interrupt each set of chest compressions for an average of 16 seconds while they deliver the heretofore recommended "2 quick breaths." Even if there are 2 or



Call 9-1-1



Find center of chest and perform fast, forceful compressions.



Lift hands slightly off chest after each compression.

Figure. Call 9-1-1. Find the center of the chest and do forceful, fast compressions. Lift hands slightly off chest after each compression. Figure courtesy of Margaret Hartshorn, Biomedical Communications, The University of Arizona, Tucson.



more bystanders, it is more helpful to trade off chest compressions than to have 1 person breathe for the victim because compressing the chest hard and fast without stopping is very exhausting.

Standard CPR Still Needed for Respiratory Arrest

Despite continuous-chest-compression CPR being the method of choice for

sudden unexpected collapse, conventional CPR with mouth-to-mouth breathing remains the appropriate rescue technique for patients who are in respiratory arrest. In respiratory arrest, which in most cases is caused by drug overdose, alcohol intoxication, carbon monoxide poisoning, a severe asthma attack, drowning, or choking, the primary problem is not the heart but a lack of oxygen (suffocation) that even-

tually leads to cardiac arrest. Note that in all these circumstances the collapse is neither sudden nor unexpected. Only 1 in 20 arrests is due to respiratory arrest. For respiratory arrest, chest compressions plus ventilation are recommended (the Table).

Disclosures

None.