PROCEDURE

CPR

CPR is an emergency procedure that circulates blood during cardiac arrest.

PURPOSE
Maintain blood and oxygen flow during cardiac arrest

PROCEDURE TYPE
Therapeutic bedside procedure using compressions, breaths, and defibrillation

WHERE IT IS DONE
At the bedside or wherever the person collapses

ANAESTHESIA
None

HOW LONG IT TAKES
Minutes to longer; until circulation returns or resuscitation ends

PREPARATION
None; start immediately and call emergency services

RECOVERY
Hospital admission after survival; no driving until medically cleared

MAIN RISKS
Rib injury, internal injury, vomiting, aspiration

RESULTS
Circulation response known immediately; longer-term recovery assessed over time

Overview

Cardiopulmonary resuscitation, or CPR, is an emergency procedure used when someone is in cardiac arrest. Cardiac arrest means the heart has stopped pumping blood effectively. The person is unresponsive and is not breathing normally. They may make occasional gasping sounds, which are not normal breathing.

CPR uses repeated chest compressions to push blood toward the brain and other organs. Rescue breaths may also be given to provide oxygen. An automated external defibrillator, or AED, can check the heart rhythm and deliver an electric shock when appropriate.

CPR does not always restart the heart by itself. Its main purpose is to maintain some blood flow until an AED and emergency medical treatment are available.

Why the procedure is performed

CPR is performed when cardiac arrest is suspected. Possible situations include a heart problem, drowning, choking, a severe allergic reaction, major injury, poisoning, or a drug overdose. CPR is the same emergency response even though the reason for the cardiac arrest may differ.

Starting CPR promptly gives emergency treatment a better chance of working. Bystanders do not need to determine why the person collapsed before beginning.

If a person is unresponsive and not breathing normally, call your local emergency number and follow the dispatcher's instructions. Send someone for an AED if one is available.

Who should and should not have it

CPR is appropriate for a person who:

Members of the public are generally advised not to spend time trying to find a pulse. An emergency dispatcher can help you decide what to do.

CPR should not be given to someone who is awake, responding, and breathing normally. Chest compressions can cause injury when there is no cardiac arrest.

CPR may be withheld or stopped when:

A do-not-attempt-resuscitation decision applies specifically to CPR. It does not mean that all medical care, symptom relief, or comfort care should stop.

Healthcare professionals consider the person's known wishes, clinical circumstances, and applicable laws. In an unexpected community collapse, bystanders should call emergency services and follow the dispatcher's directions rather than delay CPR while searching for documents.

- Is unresponsive
- Is not breathing normally or is only gasping
- Has no signs of circulation when assessed by a trained professional
- The scene is unsafe for rescuers
- Clear signs show that death cannot be reversed
- A valid do-not-attempt-resuscitation decision applies
- Circulation and normal breathing return

- An emergency team takes over
- The rescuer becomes physically unable to continue

How to prepare

There is no routine preparation because CPR must begin immediately.

First make sure the area is safe. Check whether the person responds, call emergency services, and ask someone to bring an AED. Place the person flat on their back on a firm surface when this can be done safely.

If you are in a hospital or another healthcare facility, the treating facility's own emergency instructions take priority. Staff may activate a resuscitation team and use additional equipment.

CPR training can help you feel more prepared, but lack of training should not prevent you from helping. Emergency dispatchers can give step-by-step instructions by phone.

What happens during the procedure

For adult CPR, chest compressions are given in the centre of the chest. The rescuer presses hard and fast, usually at 100 to 120 compressions per minute, allowing the chest to return to its usual position after each compression.

A trained rescuer may give 30 compressions followed by two rescue breaths. Someone who is not trained, or is unable or unwilling to give breaths, can provide continuous hands-only CPR for an adult who suddenly collapses.

Rescue breaths are especially important when cardiac arrest is linked to a breathing problem, such as drowning, and in many infants and children. Emergency dispatchers can explain the appropriate technique.

An AED is attached as soon as possible. The device uses spoken or visual prompts to guide the rescuer. It checks the heart rhythm and gives a shock only if the rhythm is one that may respond. CPR continues immediately after the rhythm check or shock.

Emergency clinicians may also:

CPR continues until circulation returns, an emergency team decides to stop, or another accepted stopping condition is reached.

- Place a breathing tube or use other airway equipment

- Give oxygen and emergency medicines
- Monitor the heart rhythm
- Treat causes that may be reversible

Recovery and what to expect afterward

If circulation returns, you will usually need immediate hospital care. You may remain unconscious or confused while your brain and other organs recover.

Chest soreness is common after compressions. Rib or breastbone injuries can occur. Pain is assessed and treated in hospital while clinicians also check for more serious injury.

Eating and drinking may not begin straight away. If you were unconscious or had a breathing tube, the healthcare team may first check that you can swallow safely.

Activity usually returns gradually. Weakness, tiredness, sleep changes, memory problems, anxiety, or low mood can occur after cardiac arrest and intensive care. Rehabilitation may include physical therapy, heart rehabilitation, and support for thinking or emotional difficulties.

Do not drive after leaving hospital until your healthcare team has medically cleared you. Driving restrictions may relate to the cause of the cardiac arrest, the risk of another event, and local licensing rules.

Your return to work depends on your recovery, the underlying condition, and the physical or safety demands of your job. Some people need a phased return.

Risks and possible complications

Chest compressions must be forceful enough to move blood. Injuries can happen even when CPR is performed correctly.

Possible complications include:

A rib injury should not make a rescuer stop effective CPR during cardiac arrest. The immediate danger from absent blood flow is greater than the risk of injury from chest compressions.

Not everyone survives cardiac arrest, even with prompt, well-performed CPR. Some survivors have lasting effects because the brain and other organs received too little oxygen before circulation returned.

- Bruising or injury to the ribs or breastbone

- Injury to the lungs or internal organs
- Vomiting and breathing stomach contents into the lungs
- Skin irritation or burns from defibrillator pads
- Brain, heart, kidney, or other organ injury caused by the cardiac arrest itself

Results and follow up

The immediate result is clear during resuscitation: circulation returns, CPR continues, or the resuscitation team decides further attempts will not work.

If circulation returns, clinicians look for and treat the reason for the cardiac arrest. Tests may include an electrocardiogram, blood tests, heart imaging, brain imaging, or examination of the heart's arteries.

Longer-term recovery cannot always be predicted immediately. Sedatives, low body temperature, seizures, and severe illness can affect early examinations. Neurological outlook is usually assessed over time using several types of information rather than one early test.

Follow-up after discharge may address heart treatment, implanted heart devices, medication, rehabilitation, memory or concentration changes, emotional health, and support for family members or witnesses.

Alternatives

There is no equivalent substitute for CPR when someone is in cardiac arrest.

An AED complements CPR rather than replacing it. Defibrillation can correct certain abnormal heart rhythms, but the device will not shock every cardiac arrest. Compressions should continue according to the AED prompts.

Hands-only CPR is an alternative to CPR with rescue breaths for an adult who suddenly collapses. It is easier for an untrained bystander, but it does not provide added breaths. CPR with breaths is particularly important when lack of oxygen is likely, including drowning and many arrests involving children.

Mechanical compression devices can deliver automated compressions. Emergency teams may use them in selected situations, such as difficult transport or certain procedures. They are not a routine replacement for prompt, high-quality manual CPR.

For someone with a valid decision not to receive CPR, the alternative is care focused on

comfort and other treatments that match that person's goals. This may include relief of pain, breathlessness, or distress.

When to call your healthcare team

Cardiac arrest is always an emergency. Call emergency services immediately if someone becomes unresponsive and is not breathing normally or is only gasping. Begin CPR and use an AED if available.

After surviving cardiac arrest, seek emergency help for another collapse, fainting, severe breathing difficulty, new weakness, or chest pressure that may represent a new heart problem.

Contact your healthcare team promptly for worsening chest-wall pain, fever, increasing shortness of breath, wound or device concerns, repeated palpitations, or problems taking prescribed medicines.

Routine follow-up is appropriate for ongoing tiredness, sleep problems, memory changes, anxiety, low mood, questions about activity, or planning a return to driving and work.

Common questions

Will I be asleep during CPR?

A person in cardiac arrest is unconscious, so anaesthesia is not needed. If circulation returns, sedation may be used later for a breathing tube or another hospital procedure.

Can I drive home afterward?

No. A person who survives CPR requires urgent hospital assessment and usually admission. After discharge, do not drive until you have been medically cleared.

How painful is CPR?

You are unconscious during cardiac arrest. If you recover, your chest may feel bruised or sore, and rib injuries are possible. The hospital team can assess and treat this pain.

When will I know whether it worked?

Clinicians know immediately whether circulation has returned. The cause of the arrest and the likely level of recovery may take hours, days, or longer to assess.

Can CPR make a stopped heart start beating again?

Sometimes circulation returns during CPR, but compressions mainly maintain blood flow. An AED, emergency medicines, and treatment of the underlying problem may be needed to

restore an effective heartbeat.

Can I hurt someone by doing CPR?

Chest injuries are possible, even with correct technique. If the person is unresponsive and not breathing normally, the danger of delaying CPR is greater. Follow the emergency dispatcher's instructions.

Sources

- American Heart Association. What Is CPR?
- Panchal AR, Bartos JA, Cabañas JG, et al. Part 3: Adult Basic and Advanced Life Support. 2020 American Heart Association Guidelines for CPR and Emergency Cardiovascular Care . Circulation. 2020;142(suppl 2):S366-S468.
- Olasveengen TM, Semeraro F, Ristagno G, et al. European Resuscitation Council Guidelines 2021: Basic Life Support. Resuscitation . 2021;161:98-114.
- Nolan JP, Sandroni C, Böttiger BW, et al. European Resuscitation Council and European Society of Intensive Care Medicine Guidelines 2021: Post-resuscitation care. Resuscitation . 2021;161:220-269.