CONDITION

Cardiac arrest

Learn how to recognize cardiac arrest, give CPR, use an AED, and understand its causes, emergency treatment, recovery, and follow-up care.

WHAT IT IS
Sudden failure of the heart to pump blood

BODY SYSTEM
Heart and circulation

MAIN SYMPTOMS
Sudden collapse, unresponsiveness, abnormal breathing, gasping

WHAT CAUSES IT
Electrical problem or underlying disease

HOW IT IS DIAGNOSED
Clinical assessment and heart rhythm monitoring

MAIN TREATMENT
Emergency resuscitation with CPR and defibrillation

CAN IT BE CURED?
Sometimes - normal circulation can be restored

IS IT AN EMERGENCY?
Yes - always requires immediate treatment

LONG-TERM OUTLOOK
Ranges from good recovery to neurological disability or death

Overview

Cardiac arrest happens when the heart suddenly stops pumping enough blood to the brain and other vital organs. The person becomes unresponsive and stops breathing normally. Without immediate treatment, cardiac arrest is fatal.

Cardiac arrest is not the same as a heart attack. A heart attack occurs when blood flow to part of the heart muscle is blocked. During a heart attack, the heart usually continues to beat and the person may remain awake. However, a heart attack can disrupt the heart's electrical system and lead to cardiac arrest.

Many cardiac arrests are caused by an abnormal heart rhythm. Ventricular fibrillation, or VF, makes the lower chambers of the heart quiver instead of pumping. Pulseless ventricular tachycardia is another dangerously fast rhythm that does not produce effective blood flow. An

automated external defibrillator, or AED, can recognize these rhythms and deliver a shock that may allow a normal rhythm to return.

Cardiac arrest is always an emergency. Early recognition, cardiopulmonary resuscitation, or CPR, and rapid use of an AED are central parts of treatment. Emergency medical care and hospital treatment are still needed even if the person wakes up after a shock.

Symptoms

Cardiac arrest usually causes a sudden collapse. The person:

Gasping is not normal breathing. A person who is unresponsive and only gasping should be treated as being in cardiac arrest.

If someone suddenly collapses, call the local emergency number or direct another person to call. Start CPR and send someone to get an AED if one is available. Follow the emergency dispatcher's instructions. Do not delay CPR to search for a pulse unless you are a trained healthcare professional.

For a teen or adult who suddenly collapses, an untrained bystander can give hands-only CPR by pushing hard and fast in the center of the chest. A trained rescuer may provide chest compressions with rescue breaths. Breaths are especially important in arrests related to drowning, breathing problems, or many pediatric emergencies. The AED will give spoken or visual instructions and will deliver a shock only when it detects an appropriate rhythm.

Some people have warning symptoms before cardiac arrest, but others do not. Possible warning symptoms include chest pressure, shortness of breath, a racing or irregular heartbeat, fainting, unusual weakness, or severe lightheadedness. These symptoms do not always mean cardiac arrest is about to happen, but they may require prompt medical assessment.

- Does not respond when spoken to or tapped
- Is not breathing normally
- May make occasional gasping, snorting, or gurgling sounds
- Has no detectable pulse when checked by a trained healthcare professional

Causes and risk factors

Cardiac arrest results from a failure of the heart's pumping action. This often begins with an electrical problem, but many diseases and emergencies can trigger it.

Coronary artery disease is an important underlying cause in adults. In this condition, fatty deposits narrow the arteries that supply the heart. A sudden blood clot can cause a heart attack, which may then trigger a dangerous heart rhythm.

Other heart-related causes include heart failure, weakened or thickened heart muscle, inflammation of the heart, severe heart valve disease, and heart abnormalities present from birth. Scar tissue from a previous heart attack can also interfere with electrical signals.

Some people have inherited electrical or heart muscle disorders, such as long QT syndrome, Brugada syndrome, hypertrophic cardiomyopathy, or arrhythmogenic cardiomyopathy. These conditions may increase the risk of dangerous rhythms even when the heart appears normal on some tests. A family history of unexplained sudden death, especially at a young age, can be relevant.

Cardiac arrest may also be caused by conditions outside the heart. These include:

Risk can be higher in people with known coronary artery disease, a previous heart attack, heart failure, or a previous cardiac arrest. Smoking, high blood pressure, diabetes, and high cholesterol contribute to coronary artery disease and may indirectly increase risk. However, cardiac arrest can also occur in people without a known heart condition.

- Severe lack of oxygen, such as from choking, drowning, or a serious asthma attack
- Major blood loss or severe shock
- A blood clot in the lungs
- Dangerous changes in potassium or other body chemicals
- Drug toxicity or overdose
- Severe infection or major metabolic illness
- Trauma, electrocution, or extreme changes in body temperature
- Pressure around the heart or within the chest that prevents the heart from filling normally

Diagnosis

During the emergency, cardiac arrest is recognized from unresponsiveness, abnormal or absent breathing, and the absence of signs of circulation. Healthcare professionals quickly assess the heart rhythm with a monitor or defibrillator.

The rhythm may be shockable, such as ventricular fibrillation or pulseless ventricular tachycardia. It may instead be nonshockable, such as asystole, which means no meaningful electrical activity, or pulseless electrical activity, in which the monitor shows electrical signals

but the heart is not pumping effectively. Nonshockable rhythms are treated with CPR, medicines, and correction of the underlying cause rather than an AED shock.

If circulation returns, clinicians work to identify what caused the arrest and whether any organs were injured. Tests may include an electrocardiogram, or ECG, which records the heart's electrical activity. Blood tests can look for heart muscle injury, electrolyte problems, drug effects, infection, or organ damage.

Imaging may include an echocardiogram to examine the heart's structure and pumping ability. Coronary angiography may be used when a blocked heart artery is suspected. During this procedure, dye and X-rays show the coronary arteries, and a blockage may sometimes be opened with a balloon and stent.

Brain imaging, chest imaging, or tests for a lung blood clot may be needed in selected cases. After recovery, longer-term heart rhythm monitoring, cardiac MRI, exercise testing, or genetic assessment may help identify an inherited or structural condition.

Treatment and management

Treatment begins at the site of the collapse. The priorities are activating emergency services, starting high-quality CPR, and using an AED as soon as possible.

Chest compressions move a limited amount of blood to the brain and heart until normal circulation can be restored. Interruptions should be kept as brief as possible. An AED analyzes the rhythm and advises a shock when appropriate. Anyone can use an AED by following its prompts.

Emergency medical professionals continue CPR, manage the airway and breathing, monitor the heart rhythm, and give treatments based on the rhythm and likely cause. Defibrillation is used for shockable rhythms. Medicines may be given during resuscitation, but they do not replace CPR or defibrillation.

Clinicians also look for reversible causes. Treatment might include providing oxygen, correcting dangerous electrolyte changes, treating an overdose, relieving pressure in the chest, controlling severe bleeding, or addressing a blood clot.

If opioid overdose may be involved, naloxone can be given when available. Naloxone should not delay emergency calls, CPR, or AED use when the person has no signs of circulation.

After the heart starts pumping again, hospital care focuses on protecting the brain and other organs. The person may need a breathing machine, blood pressure support, treatment for seizures, and careful temperature management. Clinicians also manage oxygen, carbon dioxide, blood glucose, and fever while avoiding levels that could worsen injury.

Treatment of the underlying cause may include opening a blocked coronary artery, treating heart failure, stopping a medicine that affects heart rhythm, or addressing a lung clot. Decisions depend on test results and the person's overall condition.

Some survivors may need an implantable cardioverter-defibrillator, or ICD. This device is placed under the skin and can detect and treat certain dangerous rhythms. An ICD is not appropriate for every survivor, particularly when the arrest had a clearly reversible cause. Some people instead need a pacemaker, catheter ablation to treat an abnormal electrical pathway, surgery, or treatment of an inherited condition.

Complications

The brain is highly sensitive to interrupted blood flow. Some survivors recover well, while others develop problems with memory, attention, movement, speech, vision, or daily activities. The full extent of neurological recovery may not be clear immediately.

Cardiac arrest and resuscitation can also affect the heart, kidneys, liver, lungs, and other organs. Chest compressions may cause rib or breastbone injuries. These injuries are treated after circulation is restored and should not discourage a bystander from performing CPR.

People may experience fatigue, sleep problems, anxiety, depression, or symptoms related to the frightening event. Family members and witnesses can also be affected. Rehabilitation and mental health support can be important parts of recovery.

A person who has had one cardiac arrest may remain at risk for another, depending on the cause. Identifying and treating the underlying problem is a central part of preventing recurrence.

Follow up

Follow-up care is usually coordinated by cardiology and primary care. An electrophysiologist, a cardiologist who specializes in heart rhythms, may also be involved. Neurology, rehabilitation, genetics, and mental health services may be recommended based on the person's needs.

Routine follow-up may include reviewing test results, checking heart function, monitoring symptoms, and adjusting treatment for coronary disease, heart failure, or rhythm disorders. People with an ICD need scheduled device checks. Cardiac rehabilitation may provide supervised activity, education, and support after recovery.

A person should take medicines only as directed and should not stop a heart or rhythm medicine without speaking with the prescribing clinician. Return to driving, work, sports, and

strenuous activity should be discussed with the care team because timing depends on the cause, recovery, and local rules.

Relatives may be offered heart testing or genetic counseling when an inherited disorder is suspected. Family members and caregivers can also learn CPR and where to find nearby AEDs.

New fainting, recurrent palpitations, increasing shortness of breath, or chest discomfort deserves prompt medical advice. Call emergency services for collapse, unresponsiveness, abnormal breathing, severe or persistent chest pressure, or symptoms suggesting another cardiac arrest. Do not drive an unresponsive or severely ill person to the hospital.

Sources

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