

MALDEK

PATIENT TEACHING · MALDEK CONDITION CATALOG

Cardiac Arrest Rhythms

A plain-English guide for you and your family

WHAT IS HAPPENING

The heart is a pump that runs on electricity. Each heartbeat starts with an electrical spark at the top of the heart; the spark travels down in an orderly wave and squeezes the heart muscle so blood shoots out to the lungs and body. When the heart stops—called cardiac arrest—the person has no pulse, no breathing, and collapses. The monitor shows one of four rhythms. Ventricular fibrillation (V-fib) means the bottom chambers quiver like a bag of worms instead of squeezing; no blood moves. Pulseless ventricular a fast heart rate (tachycardia) (V-tach) means the heart beats too fast and weak to fill or pump; again, no real blood flow. Both happen when the heart muscle does not get enough oxygen (from a blocked artery), or body salts like potassium or magnesium swing too high or low, or certain drugs or poisons scramble the electrical system. For V-fib and V-tach, we shock the heart with a defibrillator to reset the electricity and restart an organized beat. The other two rhythms—PEA (pulseless electrical activity) and asystole (flat line)—cannot be shocked because the problem is not electricity; the heart is too empty, too crushed, or too poisoned to pump. PEA means the monitor shows an electrical wave, but the heart muscle is too weak or blocked to squeeze. Asystole means no electrical spark at all—the heart is completely still. For both, we do chest compressions (CPR) to push blood by hand and hunt for the cause. The causes fall into two lists: the H's and the T's. The H's are low fluid (hypovolemia), low oxygen (hypoxia), too much acid in the blood (from no circulation), too much or too little potassium (hyperkalemia or low potassium (hypokalemia)), and body temperature too low (hypothermia). The T's are blood clot in the lung (pulmonary a traveling clot lodging in a vessel (embolism)), fluid squeezing the heart so it cannot fill (cardiac tamponade), air or blood collapse of the lung (tension pneumothorax), poison or drug overdose (toxins), and a blocked artery to the heart (thrombosis—coronary or pulmonary). The brain can only survive four to six minutes without blood flow, so every second counts. CPR buys time by squeezing the heart from the outside; it keeps a trickle of blood moving to the brain until we can restart the heart or fix the cause. If we find and fix the cause—give fluid, remove the needle from the chest to let the lung re-expand, reverse the poison, pull fluid off the heart, thin the blood to break the clot—the heart can start beating again. If we cannot fix the cause or if the brain has been without oxygen too long, the person will not survive. That is why bystanders calling 911 and starting CPR right away, before the ambulance arrives, makes such a huge difference—it keeps the brain alive until help gets there.

What you might feel

- No pulse felt anywhere on the body
- No breathing or only gasping breaths (agonal breathing)
- Unresponsive to any stimulus

- Sudden collapse without warning
- Skin turns blue or gray (cyanosis), especially lips and fingertips
- Pupils become wide and do not shrink when light is shined into the eyes
- No normal heart sounds heard with a stethoscope, or very weak disorganized sounds
- Monitor shows ventricular fibrillation (VF): a wild, irregular, squiggly line with no clear beats
- Monitor shows ventricular a fast heart rate (tachycardia) (VT) without a pulse: very fast, wide, regular peaks but no blood is moving
- Monitor shows a flat line (asystole) or very slow, dying beats (PEA: electrical activity without a pulse)

Call the doctor right away if...

- No pulse and no breathing—start CPR immediately and call for help; every second without blood flow kills brain cells
- Rhythm on monitor is ventricular fibrillation (VF) or pulseless ventricular a fast heart rate (tachycardia) (VT)—shock with a defibrillator as soon as possible to try to reset the heart
- Flat line (asystole) or PEA rhythm—look for and fix reversible causes fast (low oxygen, low blood volume, heart squeeze from fluid around it, blood clot in lung, heart attack, low potassium or high potassium, overdose, low body temperature, tension in chest from collapsed lung)
- Person collapsed suddenly in front of you—survival depends on immediate high-quality chest compressions and early defibrillation; do not wait for advanced help to start CPR

What the care team will do

- Start chest compressions immediately within 10 seconds of finding no pulse, pushing at least 2 inches deep on the center of the chest at a rate of 100 to 120 compressions per minute
- Apply defibrillator pads and check the rhythm within the first minute; if VF or pulseless VT is seen, deliver one shock immediately then resume compressions for 2 full minutes before checking rhythm again
- Place an advanced airway (endotracheal tube or supraglottic airway) and give 1 breath every 6 seconds with 100 percent oxygen once compressions are ongoing; do not stop compressions to give breaths
- Establish IV or intraosseous (IO) access in a large vein and give 1 mg of epinephrine (adrenaline) every 3 to 5 minutes throughout the arrest

- For shockable rhythms, give 300 mg amiodarone IV push after the second shock if VF or pulseless VT continues; for non-shockable rhythms, search for and treat reversible causes using the Hs and Ts list
- Rotate the person doing compressions every 2 minutes without pausing compressions for more than 10 seconds during the switch
- Monitor end-tidal CO₂ (the amount of carbon dioxide in exhaled air) continuously with a number goal above 10 mmHg; if it suddenly jumps above 40 mmHg, check for return of spontaneous circulation immediately
- After return of spontaneous circulation, start targeted temperature management by cooling the patient to 32 to 36 degrees Celsius for 24 hours and avoid fever for at least 72 hours

Medicines you may be given — and why

Epinephrine (adrenaline)

Epinephrine is a hormone that squeezes blood vessels tight all over the body, pushing blood toward the heart and brain during cardiac arrest. It also makes the heart muscle more receptive to the next shock and helps restart a weak heartbeat.

Amiodarone

Amiodarone calms down the electrical chaos in the heart muscle during ventricular fibrillation or pulseless ventricular a fast heart rate (tachycardia) by blocking multiple ion channels (tiny gates that control electrical signals). This makes it harder for the heart to fire off wild, disorganized beats and easier for a normal rhythm to take over after a shock.

Lidocaine

Lidocaine blocks sodium channels in heart muscle cells, which slows down the wild electrical firing that happens during ventricular fibrillation or ventricular a fast heart rate (tachycardia). It is a second-choice drug if amiodarone is not available.

Where this information comes from

- AHA Advanced Cardiovascular Life Support (ACLS) 2020 Guidelines
- AHA Basic Life Support (BLS) 2020 Guidelines
- Circulation (AHA journal) 2020 update on CPR and emergency cardiovascular care

Last reviewed: 2026-07-07