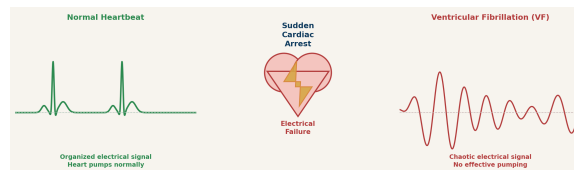


Understanding Sudden Cardiac Arrest

Why the Heart Stops — and How Bystanders Can Save a Life

Sudden cardiac arrest is an electrical emergency. The heart stops beating. Calling 911, starting CPR, and using an AED in the first few minutes can mean the difference between life and death.



Online: <https://go.riasalimd.com/cardiac-arrest-guide>

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Names & Terms You Will Hear

Term	Meaning
Sudden Cardiac Arrest (SCA)	The heart's electrical system misfires. The heart stops pumping. It is NOT the same as a heart attack.
Cardiac Arrest	The heart stops beating. Short for sudden cardiac arrest.
Ventricular Fibrillation (VF)	The most common cause of SCA. The lower chambers quiver chaotically. No blood is pumped. An AED can fix this.
Ventricular Tachycardia (VT)	A very fast, dangerous heart rhythm. It can lead to VF and cardiac arrest.
Pulseless Electrical Activity (PEA)	The monitor shows electrical signals, but the heart is not pumping. CPR + treating the cause. AED will not shock this.
Asystole	Flatline. No electrical activity. CPR + treating the cause. AED will not shock this.
AED (Automated External Defibrillator)	A portable device that gives a shock to restart a normal heart rhythm. Found in airports, schools, malls, and gyms.
CPR (Cardiopulmonary Resuscitation)	Chest compressions that keep blood moving. Used until an AED is ready.
ROSC (Return of Spontaneous Circulation)	The heart starts beating on its own again. The first goal of treatment.
ICD (Implantable Cardioverter-Defibrillator)	A small device placed under the skin. It watches the heart rhythm. It delivers a shock if a dangerous rhythm happens.
Chain of Survival	The AHA's 5-step plan: call 911, CPR, AED, advanced care, post-arrest care. Each step saves lives.



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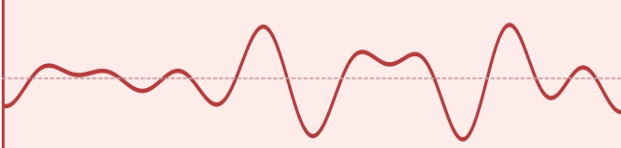


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What Is Sudden Cardiac Arrest?

- Sudden cardiac arrest (SCA) happens when the heart's electrical system fails. The heart stops pumping. The person collapses — usually without warning.
- SCA is NOT a heart attack. A heart attack is a blocked artery. SCA is an electrical failure — like a short circuit.
- A heart attack can trigger SCA. But SCA also happens in people with no prior heart disease — especially young athletes.
- About 356,000 cardiac arrests happen outside hospitals in the US each year. Only about 1 in 10 people survive without bystander help.
- The most common cause in adults is ventricular fibrillation (VF). The heart quivers instead of pumping.
- In young people, common causes include inherited electrical disorders (Long QT Syndrome, Brugada Syndrome, HCM) and chest impacts during sports.
- SCA can be reversed if treated fast. Every minute without CPR or a shock reduces the chance of survival by 7 to 10 percent.
- Bystander CPR and early AED use can double or triple survival rates.

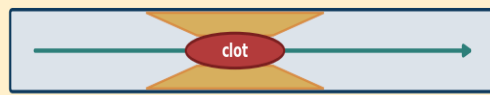
Sudden Cardiac Arrest (SCA)
Electrical Failure



- Heart's electrical system short-circuits
- Heart quivers (VF) — no blood pumped
- Person collapses, unresponsive, no pulse
- WITHOUT CPR + AED: fatal in minutes
- CAN be reversed if treated within minutes
- Caused by VF, VT, or non-shockable rhythms

CALL 911 • START CPR • USE AED

Heart Attack (Myocardial Infarction)
Plumbing Failure



blocked flow

- A coronary artery is blocked by a clot
- Heart muscle slowly dies without blood
- Person usually stays awake; has chest pain
- May progress to SCA if not treated fast
- Treated with clot-busting drugs or a stent
- Can cause SCA — but SCA has many causes

CALL 911 • TIME IS MUSCLE

Side-by-side: Sudden Cardiac Arrest (left) is an electrical failure — the heart's wiring short-circuits and the heart stops. A Heart Attack (right) is a plumbing failure — a blocked artery starves heart muscle. Both need 911 called immediately, but they are different emergencies with different treatments.



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If someone collapses near you:

1. TAP their shoulders and shout: **"Are you OK?"**
2. If unresponsive — **CALL 911 NOW** (or yell for someone else to call).
3. **Push hard and fast** on the center of the chest. 100-120 times per minute. 2 to 2.5 inches deep. Don't stop.
4. When an **AED arrives** — turn it on, attach the pads, follow its instructions.
5. **Do not stop until EMS takes over or the person wakes up.**



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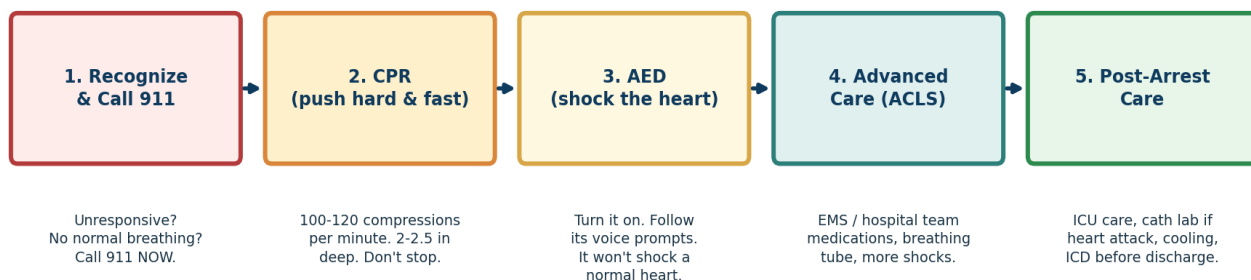


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Why It Matters

- SCA causes about 50% of all heart disease deaths in the US. It is the leading killer.
- Most SCA events happen at home (about 70%). Family members are often the only bystanders.
- Without CPR, brain damage starts in 4 to 6 minutes. It becomes permanent around 10 minutes. Every second counts.
- Areas with more trained bystanders and public AEDs have much better survival rates.
- You do NOT need medical training to save a life. Hands-Only CPR works. AEDs give voice instructions — anyone can use one.
- SCA survivors are at high risk of it happening again. Almost all need an ICD before they leave the hospital.
- Some patients can get an ICD before any arrest ever happens. Ask your cardiologist if you qualify for a preventive ICD.

The Chain of Survival: 5 Steps That Save Lives



Every minute without CPR or defibrillation reduces survival by 7-10%

The AHA Chain of Survival: 5 links that together save lives. Each step matters — a broken link reduces survival. Every bystander controls the first three links.



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Risk Factors

Some patients are more likely to develop this condition. Knowing your risk helps your care team take extra precautions.

Risk Factor	Why It Increases Risk
Coronary artery disease (CAD)	Blocked arteries reduce blood flow to heart muscle. Scar tissue can short-circuit the heart's electrical system.
Low ejection fraction (EF of 35% or lower)	A weak heart pump is the strongest predictor of SCA risk. An EF of 35% or lower usually qualifies for a preventive ICD.
Prior heart attack	Scar tissue in the heart can create dangerous electrical circuits. These circuits can trigger VT or VF.
Cardiomyopathy (HCM, dilated, ARVC)	Abnormal heart muscle disrupts normal electrical signals. This is a leading SCA cause in young athletes.
Inherited arrhythmia disorders	Long QT Syndrome, Brugada Syndrome, and CPVT cause abnormal ion channels. The heart can develop dangerous rhythms even without structural disease.
Drug-induced QT prolongation	Some antibiotics, psychiatric drugs, and antiarrhythmics can prolong the QT interval. This can trigger a dangerous rhythm called TdP or VF.
Severe electrolyte imbalances	Very low potassium or magnesium can trigger VF. This matters with vomiting, diarrhea, or diuretic use.
Prior cardiac arrest	A history of SCA is the strongest risk factor for another event. This is why almost all survivors receive an ICD.
Family history of sudden death	Sudden death before age 45 in a close relative raises concern for an inherited arrhythmia. Genetic testing and family screening are advised.



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Treatment Options

- **Right now — bystander response:** Call 911. Start hands-only CPR. Push hard and fast on the center of the chest — 100 to 120 times per minute. Use an AED when one arrives. Do not stop until EMS takes over.
- **Hands-Only CPR:** Place the heel of your hand on the center of the chest (between the nipples). Lock the other hand on top. Push down 2 to 2.5 inches. The beat of 'Stayin' Alive' by the Bee Gees is the right speed. No rescue breaths needed for adults.
- **AED (defibrillator):** Turn it on. It talks you through every step. Attach the pads. Stand clear. Press shock if it says to. Then resume CPR. An AED will ONLY shock dangerous rhythms — it cannot shock a normal heart.
- **Shockable rhythms (VF and fast VT):** The AED can fix these. Defibrillation plus CPR gives the best chance.
- **Non-shockable rhythms (PEA and flatline):** The AED will not shock these. CPR plus treating the cause (low oxygen, electrolyte problem, etc.) is the treatment.
- **Hospital care:** The EMS team and hospital team give IV drugs, breathing support, and more shocks if needed. The goal is stable blood flow.
- **After the heart restarts (ROSC):** ICU care, cooling therapy for comatose survivors, heart cath if a heart attack is suspected, and treatment of any cause.
- **ICD (long-term device):** Almost all SCA survivors get an ICD before leaving the hospital. The ICD watches the heart 24/7 and delivers a shock within seconds if a dangerous rhythm returns.
- **Wearable defibrillator (LifeVest):** A vest worn outside the body. Used as a short-term bridge while the heart recovers or before a permanent ICD.
- **Preventive ICD:** Some patients with a weak heart (EF of 35% or lower) and heart failure symptoms qualify for an ICD before any arrest ever happens. This is called primary prevention.



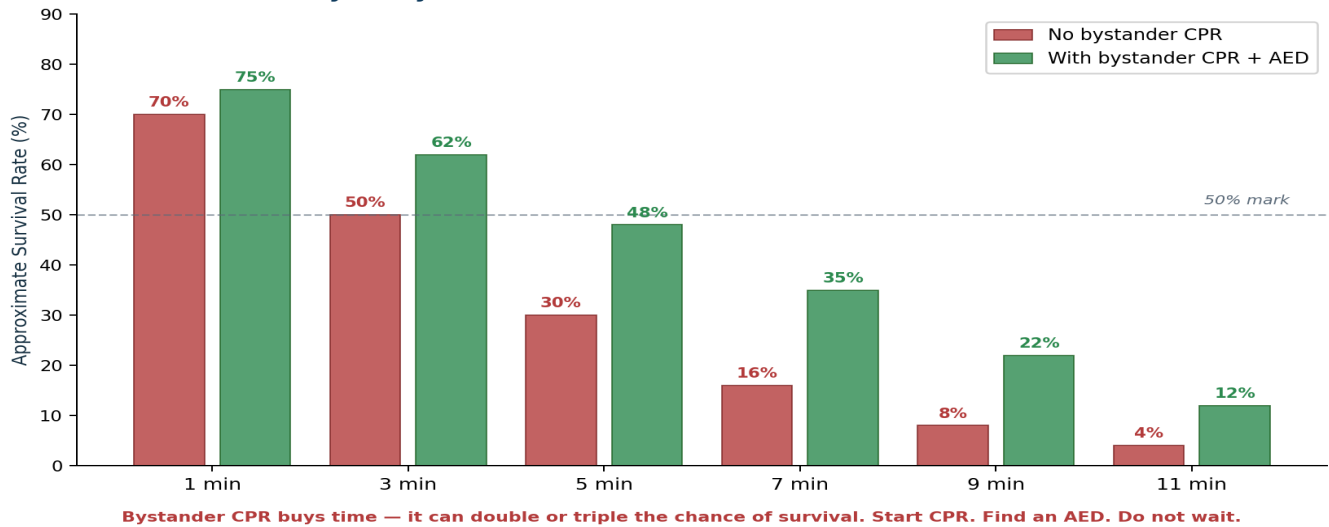
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Why Every Minute Counts: Survival vs. Time to Defibrillation



Approximate survival rate (out-of-hospital SCA) vs. minutes to defibrillation. Green bars: with bystander CPR. Red bars: without CPR. Data based on AHA guidelines and Pollack et al., NEJM 2023. Bystander CPR slows the decline — giving the AED and EMS time to arrive.



U.S. Air Force medical personnel practice CPR and AED use at Ramstein Air Base, Germany, 2020. Anyone can learn these skills in under 5 minutes — and every minute of bystander action changes the outcome. Credit: Sr. Airman Elizabeth Baker / 86th Airlift Wing / U.S. Air Force (Public Domain).

ICD — Primary vs. Secondary Prevention: Who Qualifies?



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Prevention Type	Who Qualifies	Typical Criteria	Device Goal
Secondary (after SCA)	SCA survivors; sustained VT with hemodynamic instability	Survived cardiac arrest or sustained VT not from reversible cause	Prevent recurrent fatal arrhythmia; ~50% relative risk reduction vs. drugs
Primary (before SCA)	Weak heart (EF of 35% or lower) + heart failure symptoms (NYHA II-III) despite 3 or more months of optimal medications (ACE/ARB/ARNI + beta-blocker + MRA + SGLT2i)	EF 35% or lower, NYHA II-III, on maximized GDMT for at least 3 months	Prevent a FIRST life-threatening arrhythmia; MADIT-II / SCD-HeFT evidence
Primary (channelopathy / HCM)	Long QT Syndrome (high-risk), Brugada Syndrome, CPVT, HCM with high-risk features	Genetic disorder + documented high-risk features; electrophysiologist evaluation	Prevent sudden death in inherited arrhythmia disorders without structural disease

Hands-Only CPR — No Training Needed

Place the heel of your hand on the **center of the chest** (between the nipples). Lock your other hand on top. Straighten your elbows. Push straight down **2 to 2.5 inches** at **100-120 times per minute**.

The beat of "Stayin' Alive" (Bee Gees) is exactly 103 bpm — hum it while you push. Allow the chest to fully rise between compressions. **Do not stop until EMS arrives.**



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Risks, Benefits, and Alternatives

Every choice has trade-offs. Use this table to start the shared decision conversation.

Option	Risks	Benefits	Alternatives
Bystander CPR + AED	Rare rib fractures (far better than no action). AED shocks only if needed.	Doubles or triples survival. Keeps blood moving to the brain. Can restore normal rhythm before permanent damage.	No CPR = near-certain death within minutes. Waiting without CPR is not an option.
ICD — secondary prevention (after SCA)	Small surgery risks. Rare inappropriate shocks (about 5% per year). Device infection under 1%. MRI compatibility varies by model.	Cuts risk of dying from a second SCA by about 50% vs. drugs alone. Monitors 24/7. Delivers a shock in seconds.	Antiarrhythmic drugs alone (amiodarone, sotalol) — less effective than ICD for survival. Each drug has its own side effects.
ICD — primary prevention (EF of 35% or lower)	Same small surgery risks. About 1 to 3 inappropriate shocks per 100 patients per year. Some patients need emotional adjustment.	Reduces sudden death risk by 30 to 40% in high-risk heart failure. MADIT-II and SCD-HeFT both showed a clear survival benefit.	Optimize heart failure medications first. CRT-D device if QRS is wide with left bundle branch block.
Cooling therapy after SCA coma	Infection risk. Blood pressure swings. Shivering needs sedation. Slower breakdown of some medications.	May reduce brain injury and improve recovery in comatose survivors. Used in most ICUs after cardiac arrest.	Keep body temperature below 37.5°C (no high fever). TTM2 trial showed 33°C and 37.5°C targets had similar outcomes.



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Common Misconceptions

Myth	Reality
"Cardiac arrest and heart attack are the same."	They are different. A heart attack is a blocked artery (plumbing). Cardiac arrest is an electrical failure — the heart stops. A heart attack can trigger SCA, but most SCA events are not heart attacks.
"You need training to use an AED."	AEDs are made for untrained bystanders. They give voice instructions. They will NOT shock a normal heart. Even a child can use one. Do not wait for a trained person — start now.
"If you survive SCA, you are fine."	Recovery varies. Brain injury depends on how fast CPR and the AED were used. Many survivors do very well. Some need rehab. Most need an ICD to prevent another arrest.
"Healthy young athletes don't get cardiac arrest."	Young athletes CAN have SCA from inherited conditions. HCM, Long QT, Brugada Syndrome, and chest impacts during sports are all causes. Pre-participation ECGs can detect some of these conditions.
"If someone has a DNR, don't use an AED."	In a public emergency, you will almost never have access to someone's DNR. If someone collapses in public with no visible advance directive, start CPR and use the AED. Good Samaritan laws protect bystanders in all 50 states.
"AEDs can shock a normal heartbeat."	Modern AEDs check the rhythm before any shock. They only shock VF or certain fast dangerous rhythms. They will NOT shock a normal heart, PEA, or asystole.



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Possible Complications

Knowing what can go wrong helps you spot problems early. Most complications are uncommon, especially with treatment.

Where / What	What Can Happen
Brain (oxygen deprivation)	The most serious complication after SCA. When the heart stops, the brain loses oxygen. Recovery ranges from full (if CPR was fast) to significant impairment. ICU cooling therapy aims to protect the brain after the heart restarts.
Heart muscle damage	SCA and any underlying heart attack can weaken the heart. EF may drop and need heart failure treatment after discharge.
Rib fractures (from CPR)	Common after hard chest compressions. Expected and accepted — far better than not doing CPR. Pain medicine is usually enough. Surgery is rare.
Emotional impact	PTSD, anxiety, and depression are common in SCA survivors and family members. This is normal. Ask your doctor for a referral to a counselor or cardiac psychologist. Cardiac rehab also helps with emotional recovery.
Recurrent arrest (without ICD)	Without an ICD, the risk of SCA coming back is high — especially in year one. The ICD is the most important long-term protection for almost all survivors.
ICD shocks	An ICD may sometimes fire when a shock was not needed. This is frightening but not harmful. Appropriate shocks may feel like a hard punch to the chest. Call us after any ICD shock.
Driving restrictions	Most SCA survivors cannot drive for 3 to 6 months after the event. Your cardiologist will tell you when it is safe. State rules vary.

After Surviving Cardiac Arrest — What to Expect

- **Brain recovery:** Most survivors wake up in the ICU within hours to days. Many do very well. Some need rehab for memory or focus. Cooling therapy in the ICU aims to protect the brain.



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- **Heart recovery:** Ejection fraction (EF) often improves over 3 to 6 months with medications. Your cardiologist will recheck it before deciding on a permanent ICD or a short-term wearable device.
- **ICD implant:** Almost all SCA survivors get an ICD before leaving the hospital. It watches for dangerous rhythms all day and night. It delivers a shock in seconds if one occurs.
- **Driving:** Most guidelines say no driving for 3 to 6 months after SCA. Your cardiologist will clear you when it is safe. Rules vary by state.
- **Emotional health:** PTSD, anxiety, and depression are common in survivors and family members. Please ask for a referral to a cardiac counselor. You are not alone.
- **Cardiac rehab:** A supervised exercise program that helps the heart get stronger. It also helps reduce fear of activity after SCA.
- **Family screening:** If your arrest was caused by a genetic condition (Long QT, Brugada, HCM), close relatives should be screened with an ECG and possible genetic testing.



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Young Athletes and Sudden Cardiac Arrest

- SCA in young athletes is rare but can be prevented if the cause is found first.
- **Hypertrophic Cardiomyopathy (HCM):** The #1 cause of SCA in young US athletes. The heart muscle is too thick. This causes dangerous rhythms during hard exercise.
- **Commotio Cordis:** A sharp blow to the chest at the wrong moment can trigger VF. This can happen even through a chest protector. An AED used right away can save the life.
- **Channelopathies (Long QT, Brugada, CPVT):** Inherited electrical disorders. The heart looks normal but can develop deadly rhythms. Often found by family history or a routine ECG.
- **Pre-participation ECG:** Standard in Europe. Debated in the US. It can find some of these conditions. Ask your doctor about ECG screening.
- **AEDs at sports events:** AEDs at youth sports venues save lives every year. Push for them at your school, gym, and community center.

See also: our VT/VF guide. Ventricular fibrillation is the rhythm behind most sudden cardiac arrests, and ventricular tachycardia can convert to VF. For the rhythm side of the story — and ICD therapy after surviving a cardiac arrest — read our companion guide at go.riasalimd.com/vt-vf-guide.



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Points to Know

If you remember nothing else, remember these key points.

- SCA and heart attack are different. SCA is an electrical failure. A heart attack is a blocked artery. Both need 911 called right away.
- Bystander CPR and AED use in the first few minutes can double or triple survival.
- You do NOT need formal training to save a life. Hands-only CPR and AED voice prompts are designed for anyone.
- An AED will ONLY shock dangerous rhythms. It will not accidentally shock a normal heart.
- Every minute without CPR or a shock reduces survival by about 7 to 10 percent. Start CPR now.
- Almost all SCA survivors leave the hospital with an ICD — a 24/7 personal defibrillator.
- Patients with EF 35% or less may qualify for a preventive ICD before any arrest.
- Recovery varies. Brain rehab, cardiac rehab, and family support are all part of healing.
- Download the PulsePoint app. Learn where AEDs are at home, work, and the gym.
- Learn Hands-Only CPR — it takes 5 minutes. You could save a life today.



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When to Call Us - and When to Call 911

If you are not sure, call. We would rather hear from you twice than miss a real problem.

- **Call 911 RIGHT NOW if someone** collapses and is not responding. If they are not breathing normally or have no pulse, start CPR immediately. The 911 dispatcher will guide you.
- **Call 911 if you feel** sudden loss of consciousness, a racing heart with dizziness or near-fainting, or chest pain with severe shortness of breath.
- **Call our office (727-943-5200) if** your ICD fires even once. Also call if you feel palpitations lasting more than a few seconds, feel dizzy without a clear cause, or have questions about driving or activity.
- **Call us if** you have been told your ejection fraction is 35% or less and have not yet discussed an ICD. We can evaluate you for a preventive ICD.
- **Do not drive yourself to the ER** if you have chest pain, severe shortness of breath, or palpitations with near-fainting. Call 911.

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Trusted Resources

The links below are the trusted resources Dr. Ali used to write this guide and that he recommends you visit for more information. Each is a clickable link in the digital version and a Short.io tracked URL on the printed version.

- [AHA — Cardiac Arrest \(heart.org\)](https://heart.org) - Official AHA patient page on SCA — includes CPR and AED how-to guides.
- [AHA Hands-Only CPR Training \(cpr.heart.org\)](https://cpr.heart.org) - Free 5-minute online Hands-Only CPR training from the American Heart Association.
- [PulsePoint Respond App](#) - Free smartphone app that alerts nearby CPR-trained bystanders of local cardiac arrest emergencies and shows the nearest AED.
- [Cleveland Clinic — Sudden Cardiac Arrest](#) - Plain-language overview of SCA, causes, treatment, and survival.
- [SADS Foundation \(Sudden Arrhythmia Death Syndromes\)](#) - Support and information for families affected by channelopathies (Long QT, Brugada, CPVT) and inherited SCA causes.
- [AHA — Learn CPR](#) - Find a CPR class, get certified, and learn AED use near you.



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Sources Used to Build This Guide

Every recommendation in this guide is grounded in one or more of the studies, guidelines, or trusted resources below. Short links are tracked so Dr. Ali can see which references patients are reading; nothing personally identifying is captured.

- [2023 AHA/ACC/ACEP/NAEMSP/SCAI Guideline for the Evaluation and Diagnosis of Chest Pain \(Anderson et al., JACC 2023\)](#) — incorporates updated out-of-hospital cardiac arrest recommendations [Guideline]
Primary guideline anchor for SCA recognition, initial resuscitation sequence, and post-ROSC care pathways presented in the Chain of Survival section.
- [2022 AHA Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care — Highlights \(AHA 2022\)](#) [Guideline]
Source for Chain of Survival steps, hands-only CPR protocol (100-120 compressions/min, 2-2.5 inch depth), shockable vs non-shockable rhythm definitions, and AED guidance throughout the guide.
- [Bystander CPR and Survival from Out-of-Hospital Cardiac Arrest — Pollack et al., NEJM 2023 \(PMID 36898100\)](#) [Clinical Trial]
Supports the guide's statement that bystander CPR doubles or triples survival; provides the survival-by-response-time data underlying the bar chart on minutes-to-defibrillation.
- [ICD for Primary Prevention of Sudden Cardiac Death in Heart Failure — Moss et al. MADIT-II \(NEJM 2002; PMID 11907286\)](#) [Clinical Trial]
Landmark trial supporting EF $\leq$ 30% as an ICD indication; basis for the guide's primary prevention ICD criteria table (EF $\leq$ 35%, NYHA II-III, $\geq$ 3 months GDMT).
- [SCD-HeFT — Sudden Cardiac Death in Heart Failure Trial \(Bardy et al., NEJM 2005; PMID 15659722\)](#) [Clinical Trial]
Confirms ICD mortality benefit in EF $\leq$ 35% and NYHA class II-III heart failure; underpins the primary-prevention ICD section and ICD comparison table.
- [Targeted Temperature Management \(TTM2\) — Nielsen et al., NEJM 2021 \(PMID 34133859\)](#) [Clinical Trial]
Guides the post-resuscitation care section; TTM2 showed that temperature control at 33°C vs. 37.5°C had similar neurological outcomes — supports individualized approach described in the guide.
- [Hands-Only CPR — AHA Scientific Statement \(Sayre et al., Circulation 2015; PMID 26033139\)](#) [Scientific Statement]
Basis for the guide's hands-only CPR callout (no rescue breaths needed for adult bystander CPR); confirms equivalence with conventional CPR for adult out-of-hospital SCA.
- [AHA Out-of-Hospital Cardiac Arrest Surveillance — Cobb et al. \(Circulation; cited via AHA SCA statistics 2023\)](#) [Patient Education]
Source for SCA epidemiology statistics: ~356,000 out-of-hospital cardiac arrests per year in the US; survival rate approximately 10%; AF contributing up to 70% being from coronary artery disease.
- [Cleveland Clinic — Sudden Cardiac Arrest: Symptoms, Causes and Treatment](#) [Patient Education]
Plain-language reference for what SCA is, how it differs from a heart attack, and what to do. Used as patient voice and accessibility benchmark for reading level.
- [Mayo Clinic — Sudden Cardiac Arrest](#) [Patient Education]
Used to benchmark patient-education framing; competitor source reviewed for SCA vs heart attack distinction, symptoms, and when-to-call guidance.



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- [ICD Photorealistic Image — St Jude Medical pacemaker in hand \(Wikimedia Commons, CC BY 3.0\)](#) [Image]
Companion reference: ICD device appears in the guide alongside the cover AED/CPR training photo to visualize both bystander response and in-hospital post-SCA device therapy.
- [CPR/AED Training Photo — U.S. Air Force 86th MDG \(Public Domain, 2020\)](#) [Image]
Cover photorealistic image: U.S. Air Force personnel performing CPR on a manikin with AED present — clearly shows chest compression technique and AED placement for patient teaching. Public domain.



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About This Guide

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Reviewer note: Reviewed AHA heart.org cardiac arrest page, Cleveland Clinic SCA page, and Mayo Clinic SCA page. This guide adds: a side-by-side SCA-vs-heart-attack diagram; a survival-by-minutes bar chart with and without bystander CPR; and an ICD section covering both primary and secondary prevention criteria. These elements are absent or minimal in the competitor sources.

Disclaimer

This guide is for educational purposes only and does not replace medical advice from your physician. Recommendations may not apply to every patient. Always follow the specific instructions of Dr. Ali and your care team. In an emergency call 911 or go to the nearest emergency department.



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