

Table 1. Definitions

Term	Definition
Sudden cardiac arrest (SCA)	Sudden cessation of cardiac activity with hemodynamic collapse, typically due to sustained ventricular arrhythmia
Sudden cardiac death (SCD)	Death that occurs within 1 hour of onset of symptoms in witnessed cases, and within 24 hours of last being seen alive when it is unwitnessed
Sudden unexplained death (syndrome) (SUD[S])	Unexplained sudden death occurring in an individual older than 1 year
Sudden unexplained death in infancy (SUDI)	Unexplained sudden death occurring in an individual younger than 1 year with negative pathological and toxicological assessment Note: Synonymous with “sudden unexplained infant death” (SUID)
Sudden arrhythmic death (syndrome) (SAD[S])	Unexplained sudden death occurring in an individual older than 1 year with negative pathological and toxicological assessment Note: Synonymous with “autopsy-negative sudden unexplained death”
Sudden unexplained death in epilepsy (SUDEP)	Sudden and unexpected, nontraumatic and nondrowning death of a person with epilepsy, without a toxicological or anatomical cause of death detected during the postmortem examination

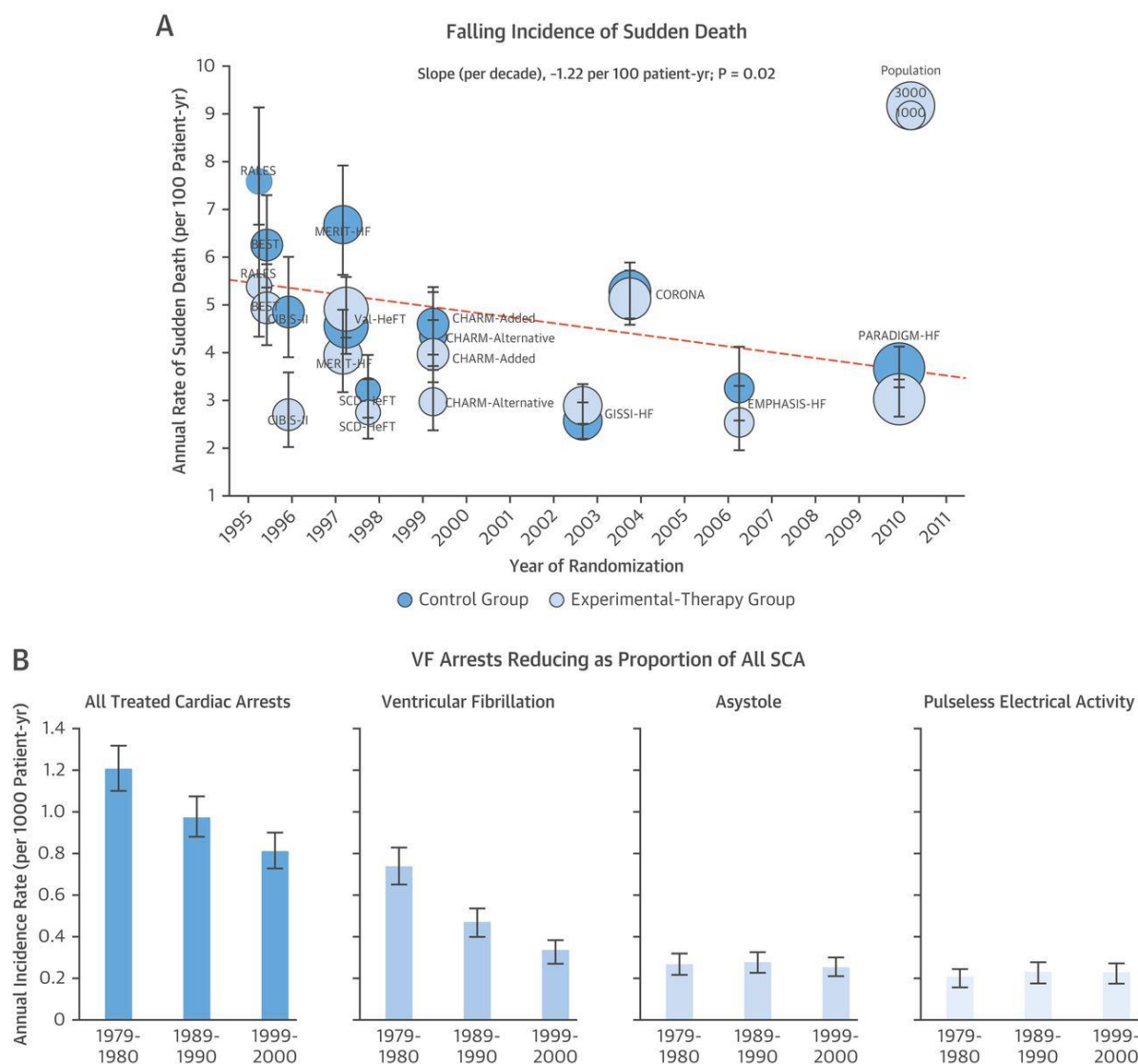


Figure 1. Changing Incidence and Pathophysiology of SCA In Recent Decades
(A) Falling incidence of SCA (B) changing arrhythmia presentations of SCA

BEST = Beta-Blocker Evaluation of Survival; CHARM-Alternative = the alternative trial of the Candesartan in Heart Failure Assessment of Reduction in Mortality and Morbidity program; CHARM-Added = the added trial of the Candesartan in Heart Failure Assessment of Reduction in Mortality and Morbidity program; CIBIS-II = Cardiac Insufficiency Bisoprolol Study II; CORONA = Controlled Rosuvastatin Multinational Trial in Heart Failure; EMPHASIS-HF = Eplerenone in Mild Patients Hospitalization and Survival Study in Heart Failure; GISSI-HF = Gruppo Italiano per lo Studio della Sopravvivenza nell'Insufficienza Cardiaca Heart Failure Trial; MERIT-HF = Metoprolol CR/XL Randomised Intervention Trial in Congestive Heart Failure; PARADIGM-HF = Prospective Comparison of ARNI with ACEI to Determine Impact on Global Mortality and Morbidity in Heart Failure; RALES = Randomized Aldactone Evaluation Study; SCA = sudden cardiac arrest; SCD-HeFT = Sudden Cardiac Death in Heart Failure Trial; VAL-HeFT = Valsartan Heart Failure Trial; VF = ventricular fibrillation.

Narayan SM, et al. New Concepts in Sudden Cardiac Arrest to Address an Intractable Epidemic. *J Am Coll Cardiol.* 2019;73:70-88.

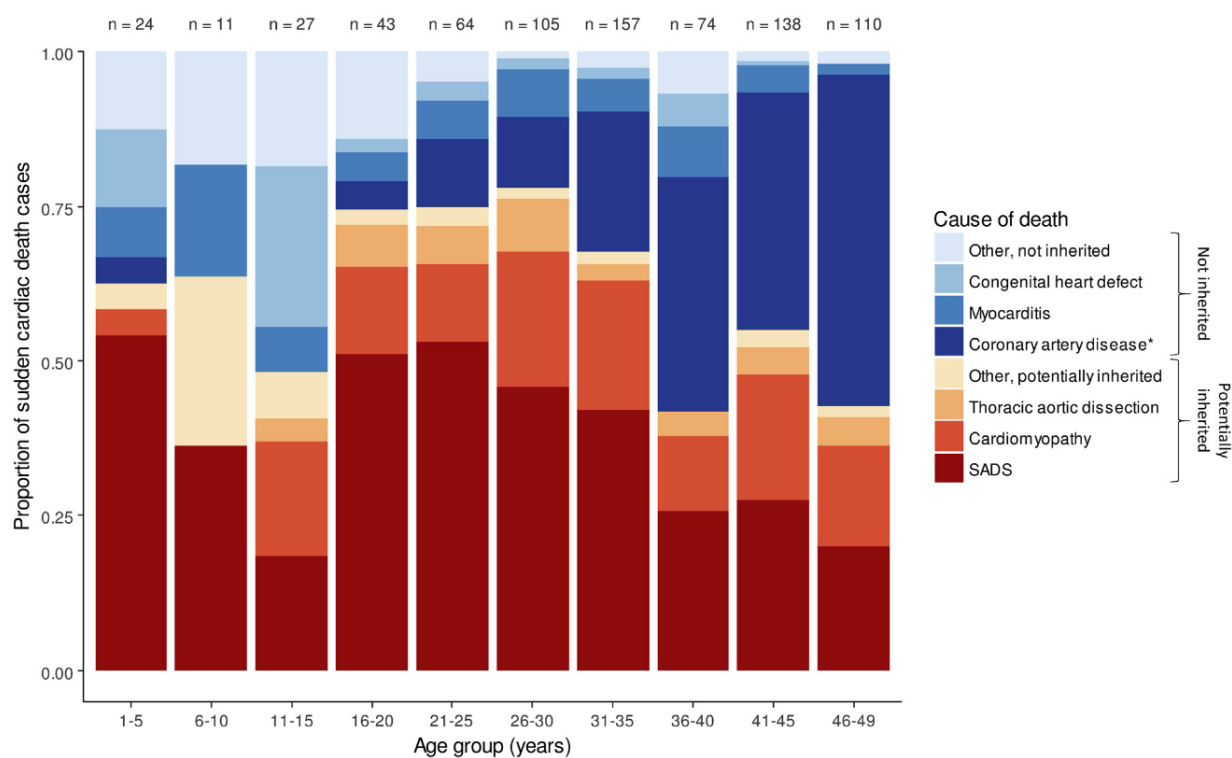


Figure 2. 2020 APHRS/HRS expert consensus statement on sudden unexplained death.

Distribution of causes of death among autopsied cases of sudden cardiac death (n = 753) according to age in persons aged 1–49 years in Denmark.

SADS5 sudden arrhythmic death syndrome. *Coronary artery disease, especially in young persons, may be due to inherited disease (eg, familial hypercholesterolemia).

Table 2. Genetic Testing**EHRA/HRS/APHRS/LAHRs 2022 Expert Consensus Statement on Genetic Testing**

State of genetic testing for sudden cardiac death or survivors of unexplained cardiac arrest

Recommendations**Should do**

Unexpected sudden deaths should be investigated with a general autopsy, toxicology, and cardiac pathology (where possible).

If a sudden death is likely to be due to a cardiac genetic cause, or remains unexplained after pathological evaluation, EDTA blood, and/or fresh tissue (e.g. liver or spleen) should be retained for potential genetic analysis. Other sources of DNA such as blood spots and tissue stored in suitable media at room temperature may suffice.

When a SCD could be attributable to a likely genetic cause, postmortem genetic testing in the deceased individual targeted to the likely cause should be performed.

When a SCD remains unexplained despite an autopsy and toxicology, post-mortem genetic testing in the deceased individual targeted to channelopathy genes should be performed when the circumstances and/or family history support a primary electrical disease.

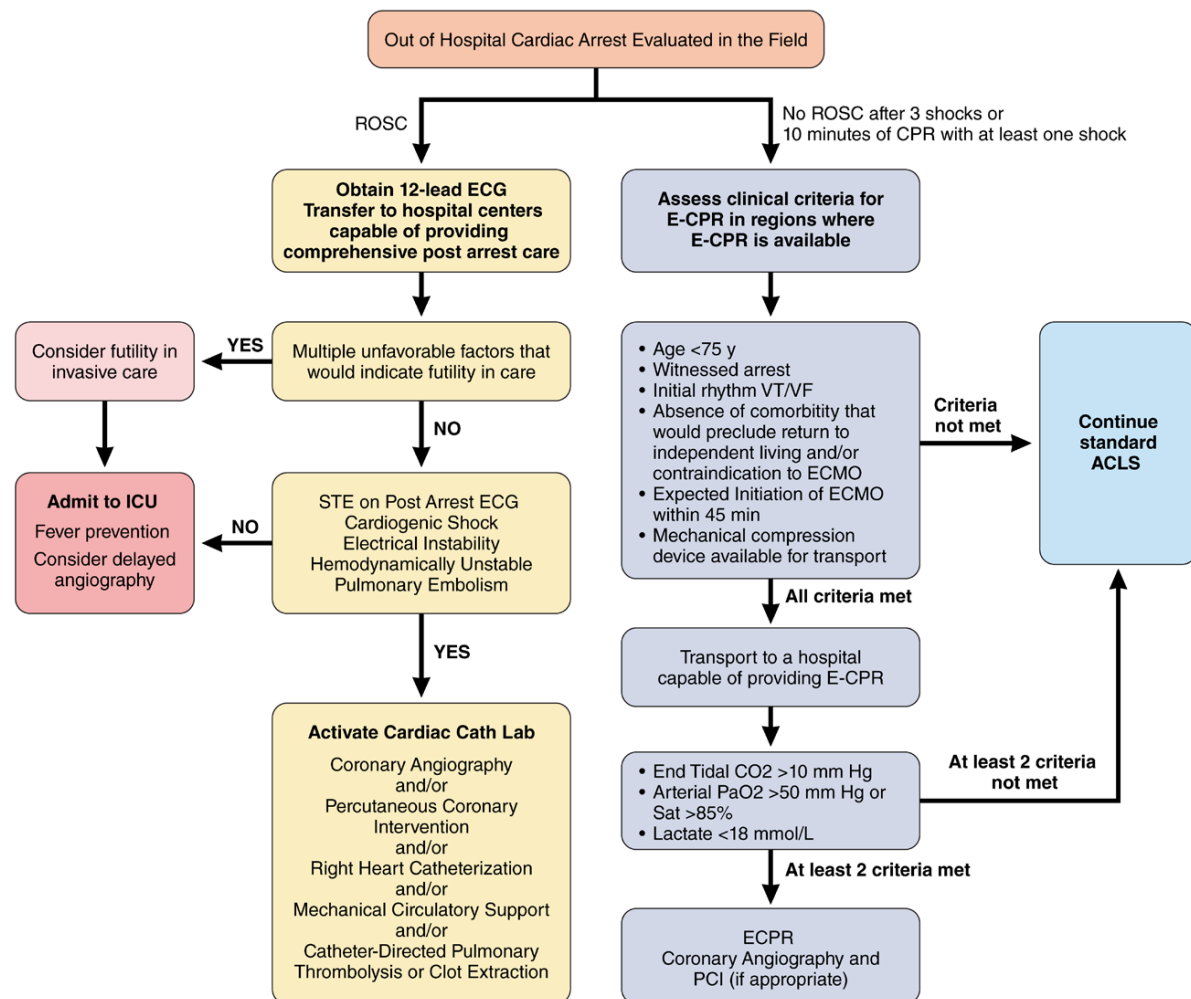


Figure 3. 2023 AHA Statement on Cardiac Catheterization Laboratory Management of the Comatose Adult Patient With an Out-of-Hospital Cardiac Arrest. An algorithm for managing the patient with out-of-hospital cardiac arrest. The approach to managing a patient with out-of-hospital cardiac arrest beginning in the field and continuing to the cardiac intensive care unit.

ACLS indicates advanced cardiac life support; CPR, cardiopulmonary resuscitation; ECMO, extracorporeal membrane oxygenation; ECPR, extracorporeal cardiopulmonary resuscitation; ICU, intensive care unit; PCI, percutaneous coronary intervention; ROSC, return of spontaneous circulation; STE, ST-segment–elevation; and VT/VF, ventricular tachycardia/ventricular fibrillation.

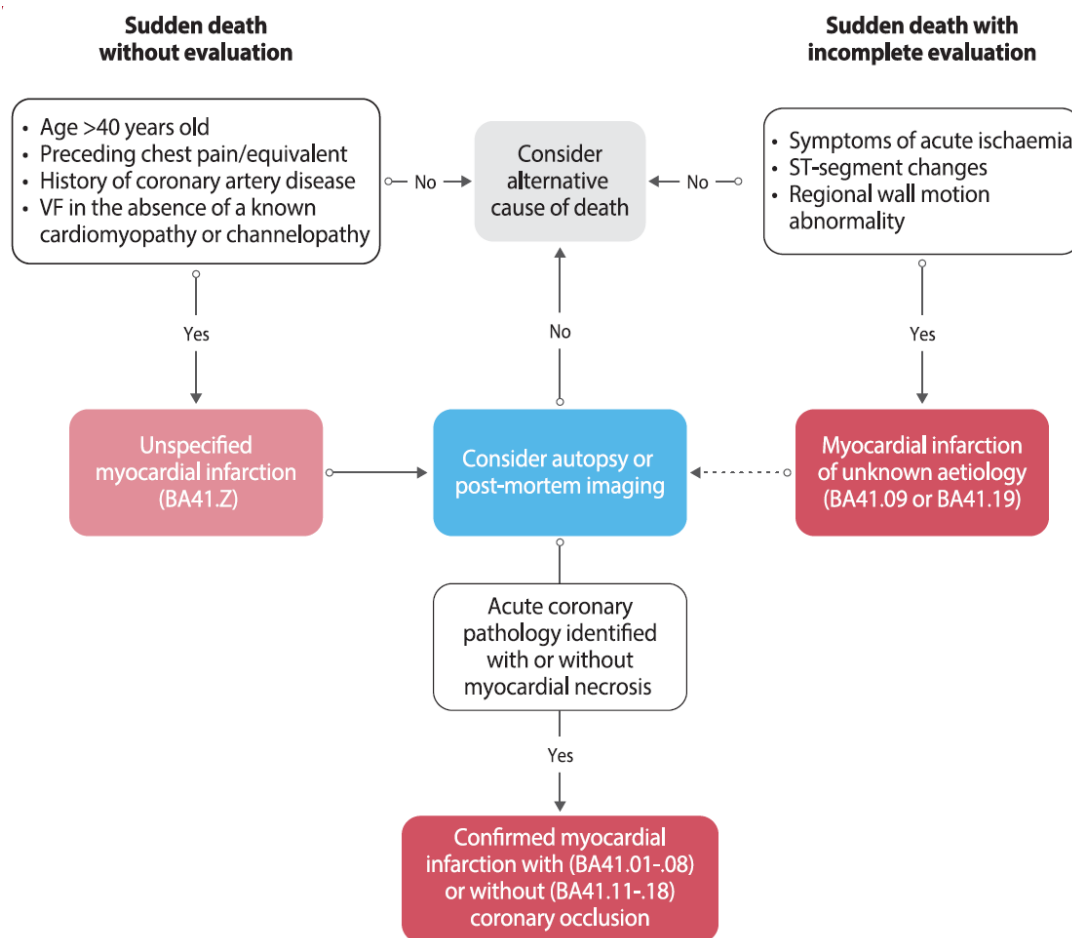


Figure 4. Diagnostic pathway for possible primary myocardial infarction following sudden death.

VF, ventricular fibrillation. Following a sudden death in the community without clinical evaluation, the diagnosis of primary myocardial infarction can be considered. Clinical features such as a history of coronary artery disease, chest pain prior to death, or documented VF in the absence of known cardiomyopathy or channelopathies make the diagnosis more likely, but in the absence of an electrocardiogram or post-mortem investigations the diagnosis is uncertain, and the ICD-11 code of unspecified myocardial infarction (BA41.Z) should be applied to recognize this. Where investigations are incomplete with no biomarker testing or coronary imaging, the diagnosis of myocardial infarction of uncertain aetiology is applied, but where there is uncertainty post-mortem imaging or an autopsy is required to confirm the diagnosis and identify the underlying acute coronary pathology.

Mills NL, et al. Fifth Universal Definition of Myocardial Infarction (2026). *Eur Heart J*. 2026.

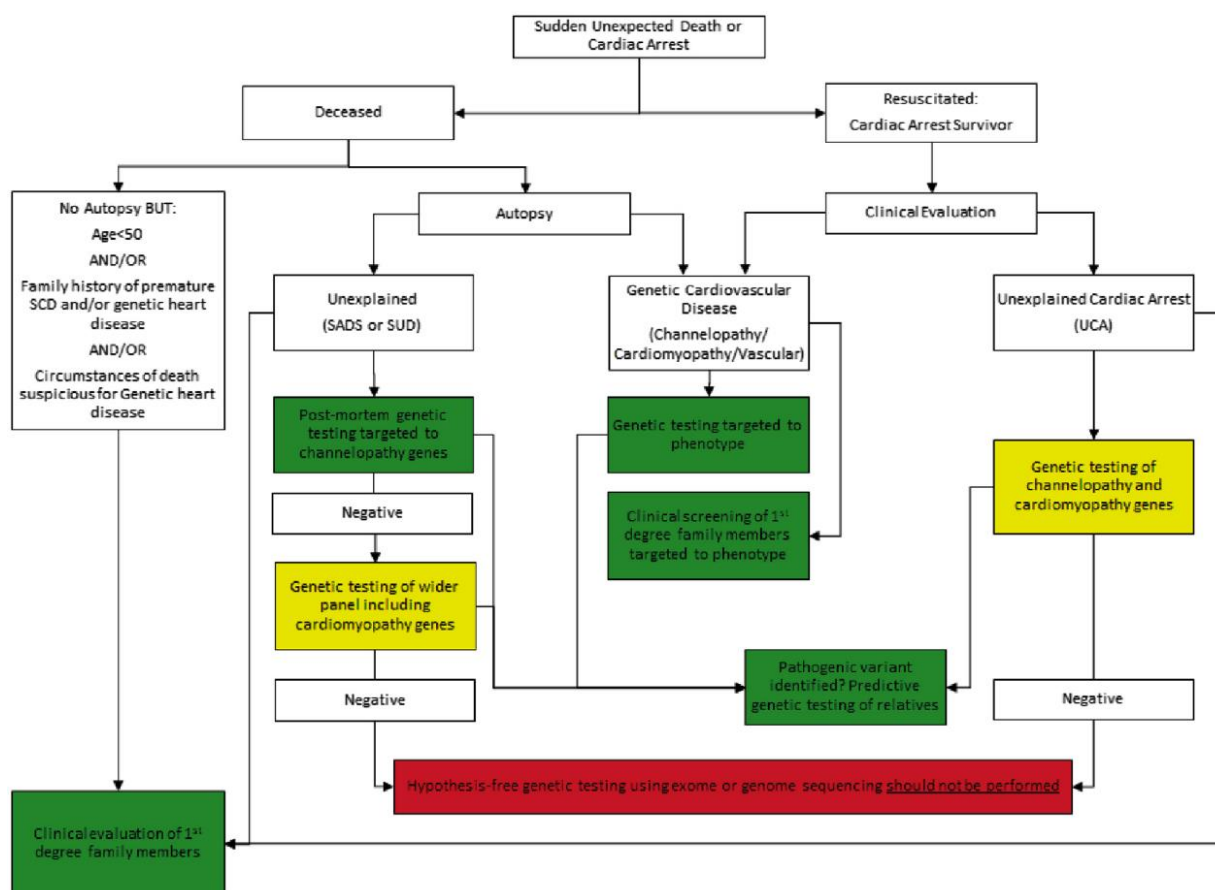


Figure 5. EHRA/HRS/APHS/LAHS 2022 Expert Consensus Statement on Genetic Testing . Flowchart of the work up of a sudden cardiac death or non-fatal cardiac arrest.

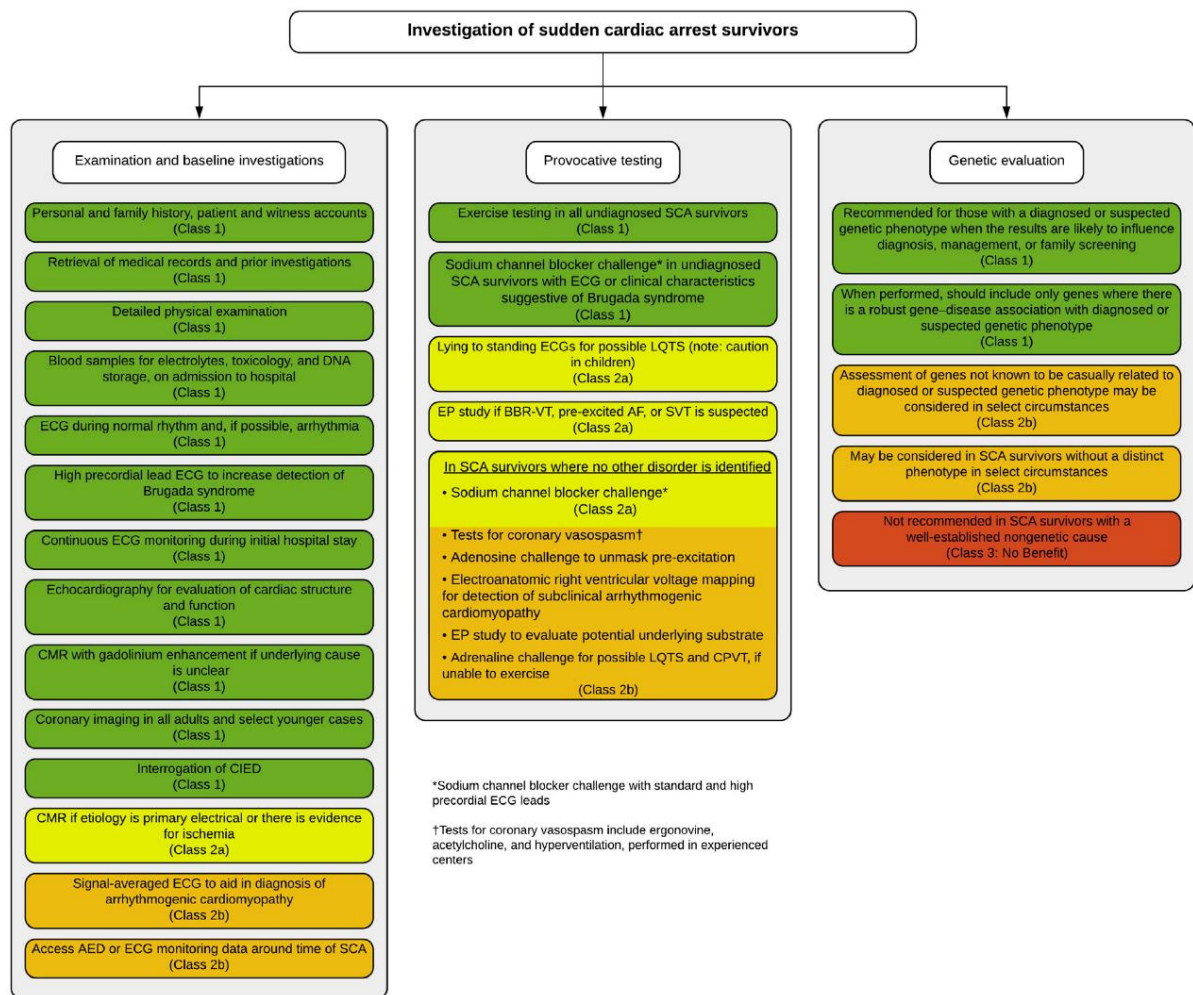


Figure 6. 2020 APHRS/HRS expert consensus statement on sudden unexplained death.
Investigation of sudden cardiac arrest survivors.

AED automated external defibrillator; AF atrial fibrillation; BBR-VT 5 bundle branch re-entry ventricular tachycardia; CIED cardiovascular implantable electronic device; CMR cardiac magnetic resonance imaging; CPVT catecholaminergic polymorphic ventricular tachycardia; ECG electrocardiogram; EP electrophysiological; LQTS long QT syndrome; SCA sudden cardiac arrest; SVT supraventricular

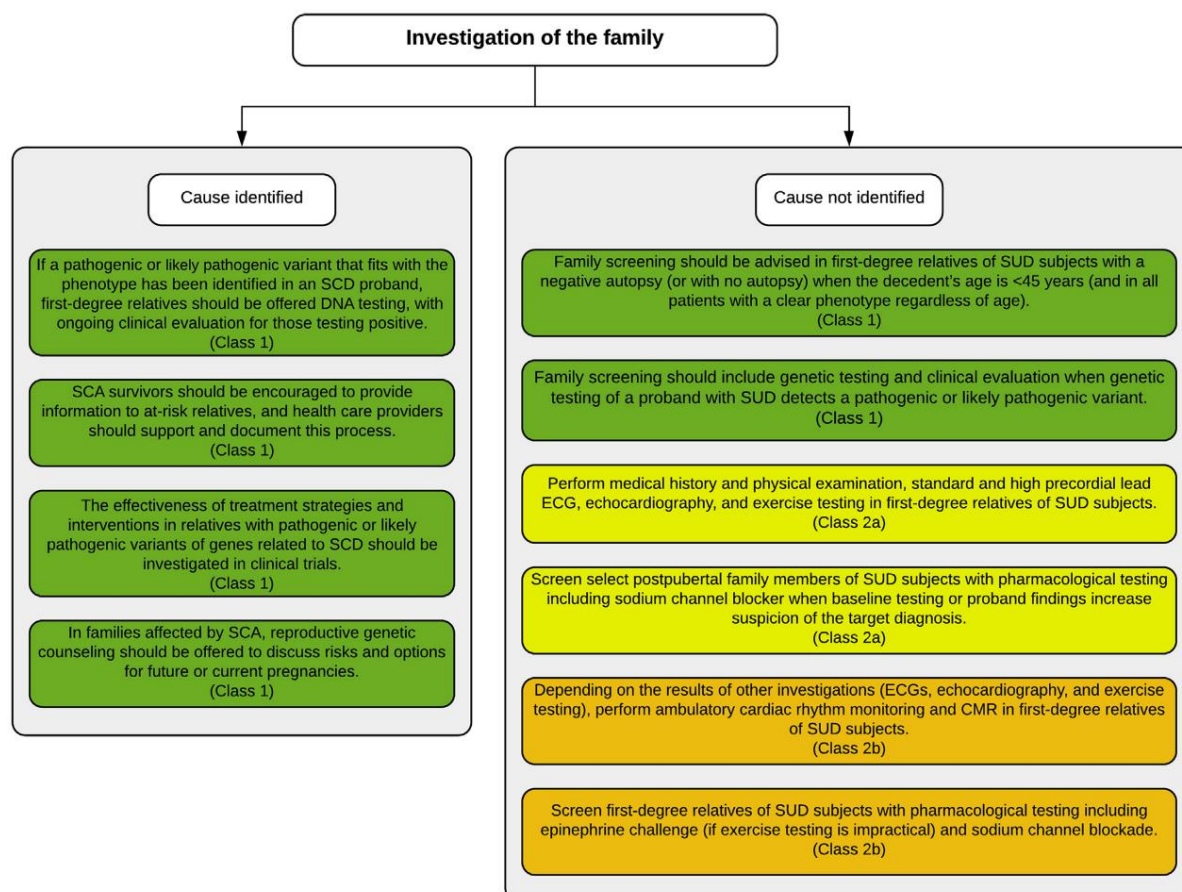


Figure 7. 2020 APHRS/HRS expert consensus statement on sudden unexplained death. Investigation of the family affected by sudden cardiac arrest and/or sudden unexplained death when cause is identified or not identified.

CMR cardiac magnetic resonance imaging; ECG 5 electrocardiogram; SCA sudden cardiac arrest; SCD sudden cardiac death; SUD sudden unexplained death.



Figure 8. ESC 2022 GL on VA and SCD. Algorithm for the evaluation of sudden death victims.

SADS, sudden arrhythmic death syndrome; SCD, sudden cardiac death; SD, sudden death.

^aAutopsy is recommended, ideally in all cases of unexpected SD and always in those under 50 years. Autopsy should include full macroscopic examination and histopathology of all organs. The heart should ideally be examined by an expert cardiac pathologist. Samples suitable for DNA extraction should be retained when inherited causes or unexplained death are suspected.

^bBased on all circumstances, this includes negative autopsies, autopsies with uncertain findings, non-ischaemic cardiomyopathies, coronary artery disease where familial hypercholesterolaemia is suspected and thoracic aortic dissections.

^cAfter informed consent of relatives.

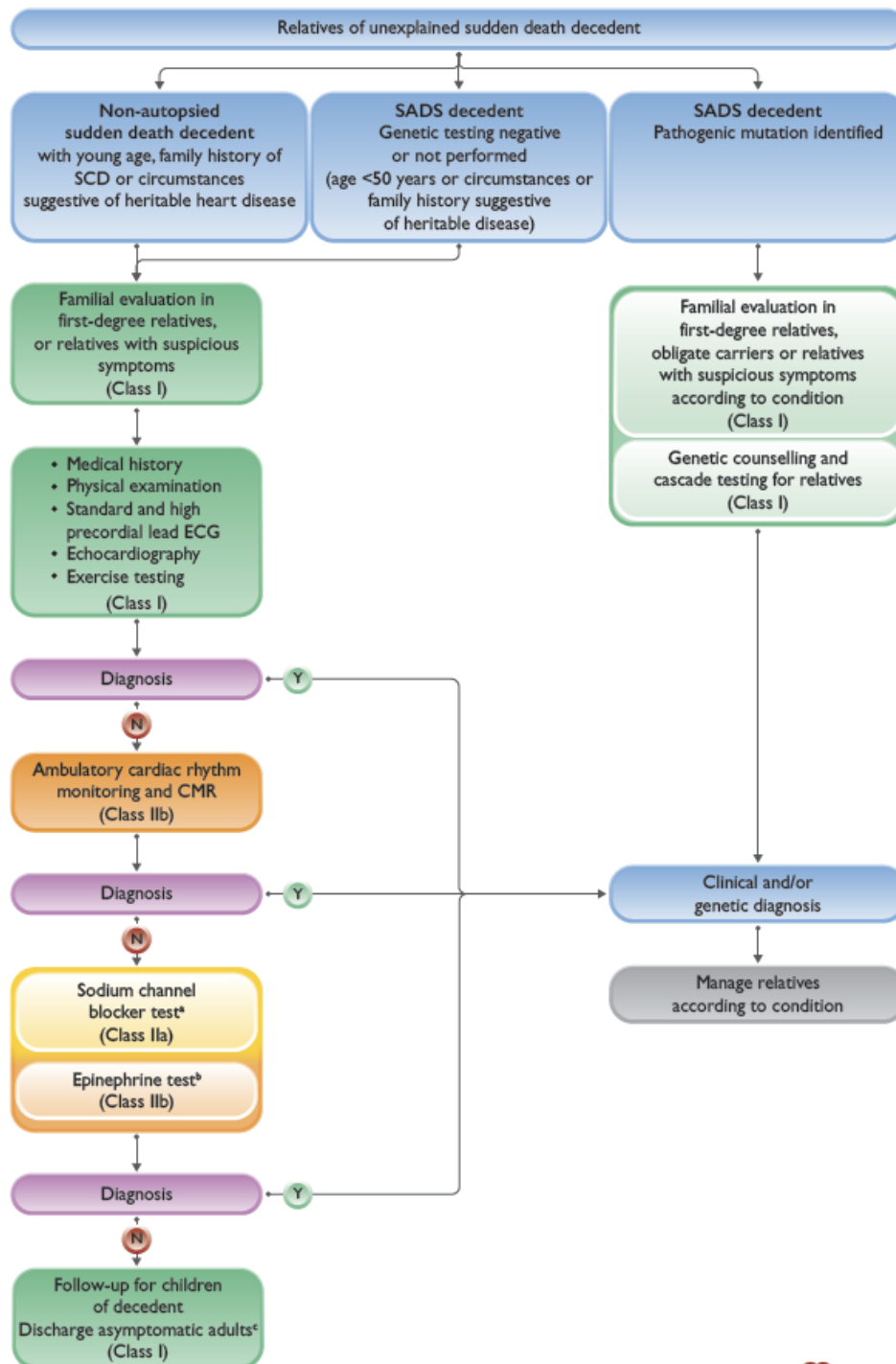


Figure 9. ESC 2022 GL on VA and SCD. Algorithm for the evaluation of relatives of unexplained sudden death decedents.

CMR, cardiac magnetic resonance; ECG, electrocardiogram; N, No; SADS, sudden arrhythmic death syndrome; SCD, sudden cardiac death; Y, Yes. ^aOver 16 years old + any suspicions for Brugada syndrome on tests or decedent circumstances of death. ^bIf exercise is not feasible. ^cRe-evaluate if change in family history or new symptoms.

Table 3. ESC 2022 GL on VA and SCD. Recommendations for evaluation of sudden death victims

Investigation of unexpected SD, especially in case of suspicion of inherited disease, as a public health priority.	I B
In cases of SD, collect a detailed description of circumstances of death, symptoms prior to death, the family history, and to review prior medical files.	I B
A comprehensive autopsy, ideally, in all cases of unexpected SD, and always in those <50 years of age.	I B
In cases of SCD, retain samples suitable for DNA extraction and consult a cardiac pathologist when an inherited cause is suspected or the cause of death unexplained.	I B
Toxicology screens in SD cases with uncertain cause of death.	I B
For SCD where the cause is known or suspected to be heritable, genetic testing targeted to the cause.	I B
Following SADS, post-mortem genetic testing targeted to primary electrical disease when the decedent is young (<50) and/or the circumstances and/or family history support a primary electrical disease.	I B
When an autopsy diagnoses possible heritable cardiac disease, refer first-degree relatives for cardiac assessment in a specialized clinic.	I B
In non-autopsied cases of SD where inherited cardiac disease is suspected, refer first-degree relatives for cardiac assessment in a specialized clinic.	I B
Following SADS, post-mortem genetic testing in the decedent for additional genes.	IIb C
Following SADS, hypothesis-free post-mortem genetic testing using exome or genome sequencing is not recommended.	III B

**Table 4. ACC/AHA/HRS 2017 GL on VA/SCD.
Postmortem Evaluation of SCD**

Standardized cardiac-specific autopsy in victims of SCD without obvious cause.	I-B-NR
Cardiac evaluation with genetic counseling and genetic testing in first-degree relatives of SCD victims who were 40 years of age or younger.	I-B-NR
Postmortem genetic testing in victims of SCD with an autopsy that implicates a potentially heritable cardiomyopathy or absence of structural disease, suggesting a potential cardiac channelopathy.	IIa-B-NR
Postmortem genetic testing for family risk profiling in victims of SCD with a previously identified phenotype for a genetic arrhythmia-associated disorder, but without genotyping prior to death.	IIa-C-LD

Table 5. ESC 2022 GL on VA and SCD. Recommendations for evaluation of relatives of sudden arrhythmic death syndrome decedents

Familial evaluation of SADS decedents is recommended:	I B
• for first-degree relatives • for relatives who must carry a mutation based on analysis of the family history • for relatives with suspicious symptoms • when the decedent's age is >50 years, or if there is other circumstantial data or family history to suggest heritable disease..	
Familial evaluation of SADS decedents to include genetic testing when post-mortem genetic testing in a SADS decedent detects a pathogenic mutation.	I B
Baseline familial evaluation of SADS decedents to include taking a medical history and performing physical examination, standard and high precordial lead ECG, echocardiography, and exercise testing.	I B
In SADS families without a diagnosis after clinical evaluation, follow-up for children of decedents until they reach adulthood.	I C
Pharmacological testing with a sodium channel blocker in relatives of SADS decedents who are 16 years or older when baseline testing and/or proband findings increase the suspicion of BrS.	IIa B
Continued Ambulatory cardiac rhythm monitoring and CMR in relatives of SADS decedents.	IIb C
Pharmacological testing including epinephrine challenge (if exercise testing is impractical) and sodium channel blocker challenge in first-degree relatives of SADS decedents with normal baseline testing.	IIb B

In SADS families without a diagnosis after clinical evaluation, follow-up is not recommended for asymptomatic adults who can be discharged with advice to return if they develop symptoms or if the family history changes.

III C

BrS, Brugada syndrome; CMR, cardiac magnetic resonance; ECG, electrocardiogram; SADS, sudden arrhythmic death syndrome.