

AHA/ACC/ESC/WHF CONSENSUS DOCUMENT

AHA/ACC/ESC/WHF Expert Consensus Document: Second Universal Definition of Heart Failure (2026)

Mary Norine Walsh, MD (United States); Lars Kober, MD, DMSc (Denmark); Karen Sliwa, MD, PhD (South Africa); Marianna Adamo, MD, PhD (Italy); Anubha Agarwal, MD, MSc (United States); Amitava Banerjee, MA, MPH, DPhil (United Kingdom); Biykem Bozkurt, MD, PhD (United States); Maja Cikes, MD, PhD (Croatia); Albertino Damasceno, MD, PhD (Mozambique); Akshay S. Desai, MD, MPH (United States); G. Michael Felker, MD, MHS (United States); Gail Hogan, (United States); Koichiro Kinugawa, MD, PhD (Japan); Michelle Kittleson, MD, PhD (United States); Carolyn S.P. Lam, MBBS, PhD (Singapore); Theresa McDonagh, MD, PhD (United Kingdom); Marco Metra, MD (Italy); Wilfried Mullens, MD, PhD (Belgium); Antonio Luiz P. Ribeiro, MD, PhD (Brazil); Yolanda Vaughn, MS (United States); Amanda Vest, MBBS, MPH (United States); on behalf of the Joint American Heart Association (AHA)/American College of Cardiology (ACC)/European Society of Cardiology (ESC)/World Heart Federation (WHF) Task Force for the Universal Definition of Heart Failure in collaboration with the Heart Failure Society of America (HFSA), the Heart Failure Association (HFA) of the European Society of Cardiology, and the Japanese Heart Failure Society (JHFS)

ABSTRACT: Heart failure (HF) remains a pressing health concern, with rising prevalence globally. Subjectivity and ambiguity in the definition of HF and its antecedent stages have limited research, global surveillance, and prevention programs. To address this, several cardiac societies and foundations convened to standardize the definition of HF in 2021 and designated stage B or pre-HF to identify individuals at risk of developing HF. In subsequent years, substantial progress and changes have been made in aspects of preventing HF, improving HF diagnosis and management, and recognizing the importance of the affected individual's voice. Global differences and disparities in HF are better understood, as are causes and comorbidities leading to differences in care, which are also influenced by access to care. This consensus document presents the Second Universal Definition of Heart Failure, aiming to standardize terminology and facilitate a uniform approach for clinicians, researchers, health systems, and policymakers. In this definition, the classification of HF phenotypes moves away from rigid left ventricular ejection fraction cutoffs, instead grouping HF into reduced, preserved, and improved ejection fraction categories to better reflect clinical realities. A universal classification of HF causes is also proposed. The document also addresses the dynamic trajectories of HF—improvement, remission, and recovery—and highlights the impact of social determinants and geographic variation on HF risk and outcomes. By providing a comprehensive, standardized framework for HF definition and classification, this document seeks to improve prevention, early detection, and management of HF worldwide, ultimately enhancing patient care and advancing global cardiovascular health.

Key Words: AHA Scientific Statements ■ cardiomyopathies ■ heart failure ■ heart failure, preserved ejection fraction ■ heart failure, reduced ejection fraction ■ stages of heart failure

Universal definitions of clinical syndromes have been instrumental in guiding diagnosis by describing a combination of symptoms, biomarkers, imag-

ing studies, and pathology that clearly characterize the syndrome. The first Universal Definition and Classification of Heart Failure¹ clarified definitions of heart failure

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(HF) that had previously been ambiguous, poorly understood, and lacking in standardization.

Since then, the incidence and prevalence of HF, particularly among individuals with preserved ejection fraction (HFpEF), have continued to increase, as has the risk of HF hospitalization and mortality.^{2,3} The growing prevalence of HF is driven by the increasing numbers of individuals with HFpEF, the aging of the population, and secular trends in the prevalence of comorbidities that drive HF risk. In addition, advances in technology and the development of more advanced imaging methods (magnetic resonance imaging, positron emission tomography), allowing earlier and more accurate disease detection, along with improvements in survival resulting from the availability of expanded treatment options, have increased prevalence. Improved strategies for early diagnosis of HF leveraging artificial intelligence may enhance HF detection even further over traditional biomarker- and imaging-based approaches, making estimates of the total population-level HF burden more accurate.

Definitions of HF, including participant inclusion criteria, vary widely in HF clinical trials. Specifically, requirements for inclusion of only narrow ranges of left ventricular ejection fraction (LVEF) often obscure possible benefits of therapies for HF phenotypes that range outside that criterion.⁴

The identification of more diverse phenotypes of HF is rapidly expanding as a result of improvements in and greater availability of advanced imaging technologies. Routine genetic screening—as ease of testing has increased and cost has decreased—has brought new understanding of genetic and familial cardiomyopathies to the clinic and to many more patients and families. In addition, the impact of comorbid diseases and their therapies on HF phenotypes has made the accurate identification of such phenotypes crucial to aid in appropriate and effective therapies. The development and greater availability of HF treatments that are specific to HF phenotype drive the necessity for accurate identification and diagnosis.

Disparities in HF care are present worldwide, with access to diagnosis and quality treatment being influenced by race, ethnicity, sex, income, geography, access to and coverage of health care, and socioeconomic status.⁵ These disparities in care are particularly concerning for high-risk, underserved groups, who have the highest risk for HF hospitalization and death.^{6,7}

These considerations underscore the need for the current update. As with other universal definitions such as that of myocardial infarction,⁸ the impetus for this updated document is to address changes in disease manifestations, diagnostic strategies, and understanding of pathophysiology. The current document serves as an update of the first definition¹ with collaboration by the American College of Cardiology, the American Heart Association, the European Society of Cardiology,

and the World Heart Federation. This document is not a clinical practice guideline, nor is it a clinical decision support document. Treatment recommendations will remain reserved for the current and future professional society HF guidelines documents.^{9,10}

PROPOSED CHANGES IN THE DEFINITION: CLASSIFICATION, PHENOTYPES, AND TRAJECTORIES

Definition of HF Syndrome

As outlined in the first Universal Definition of Heart Failure,¹ HF is a clinical syndrome with diverse causes characterized by the presence of typical symptoms, physical examination signs, and laboratory or imaging abnormalities suggestive of pulmonary or systemic congestion or changes in cardiac output that can be attributed to an underlying structural or functional cardiac abnormality. Clinical symptoms and signs of HF include dyspnea on exertion, orthopnea, jugular venous distention, rales, S3 gallop, and abdominal and leg swelling. Diagnostic certainty is amplified by confirmatory elevation in natriuretic peptide (BNP [B-type natriuretic peptide] or NT-BNP [N-terminal B-type natriuretic peptide]) levels or imaging evidence (lung ultrasound, chest radiography, echocardiography, computed tomography) of pulmonary congestion and elevated intracardiac filling pressures. It is important to note that HF is defined by the accumulation of suggestive features in a comprehensive assessment rather than by a single diagnostic test. As an example, a substantial proportion of individuals with HFpEF have normal natriuretic peptide levels despite unequivocal invasive hemodynamic evidence of HF, for example, elevation of ventricular filling pressure at rest or exercise.^{11,12} When HF is suspected, imaging is important to evaluate for structural or functional cardiac abnormalities that may inform the cause of HF and help guide the approach to treatment.

Permanence of the Diagnosis/Condition

As outlined in the first Universal Definition of Heart Failure,¹ HF progresses in stages from those at risk (stage A) to those with structural heart disease (pre-HF or stage B), those with symptomatic HF (stage C), and those with advanced disease (stage D). Once a diagnosis of symptomatic HF is established, individuals with HF are generally considered to have the diagnosis permanently, even if the clinical condition improves with treatment.

For the purpose of selecting medical treatment, individuals with HF are commonly segregated by LVEF into those with preserved or mildly reduced ejection fraction (EF) and those with reduced EF. There are limitations to phenotype categorization by EF alone (or by specific cutoff values for EF), and there is evolving evidence for the efficacy and safety of therapies across different EF

ranges. Acknowledging that EF may change with effective HF treatment, current guidelines recognize a separate subgroup of individuals whose EF increases with time and medical intervention as a separate category of HF with “improved” EF, emphasizing that these individuals may still be at risk for HF events. Although contention remains about the precise numeric thresholds of EF that should be used for HF phenotyping,¹³ it is essential to recognize the clinical relevance of incorporating the individual’s trajectory in determining the optimal approach to guideline-directed medical therapy and prognosis.

Definition and Criteria for Stages of HF

The first Universal Definition and Classification of Heart Failure¹ reviewed the American Heart Association/American College of Cardiology staging system¹⁰ and re-named stage B as pre-HF, emphasizing early detection, close monitoring, and proactive management to prevent symptomatic HF.^{10,14} This consensus reaffirms the first Universal Definition and Classification of Heart Failure staging system, as shown in Table 1.

Although most of the current guidelines are devoted to the treatment of symptomatic HF (stages C/D), most of the population is without risk factors (stage 0), at risk (stage A), or in the pre-HF stage (stage B).^{15,16} The progression from stage A to D was initially proposed to be unidirectional; that is, after evolving to clinical HF, there is no return to preclinical stages, and the emphasis should be placed on predicting and preventing HF.^{14,15,17} However, the first Universal Definition and Classification of Heart Failure staging system also includes HF “remission” with guideline-directed medical therapy and risk factor modification.

Social determinants of health should also be emphasized because they significantly affect HF risk and out-

comes, particularly among marginalized communities. Poverty, lack of education, neighborhood deprivation, and social disparities are associated with incident HF, and multiple social vulnerabilities have a cumulative effect on HF risk and prognosis.^{18,19} Among the traditional stage A risk factors, hypertension and ischemic heart disease have been among the strongest risk factors for developing clinical HF. Other stage A risk factors include congenital heart disease, chemotherapy exposure, and genetic abnormalities. Special attention should be given to cardiometabolic risk factors, including overweight, obesity, chronic kidney disease, and diabetes, because their prevalence is increasing in several global regions,^{20,21} and there are promising new opportunities for the prevention of HF in these conditions.^{14,22} Last, the American Heart Association’s Life’s Simple 7²³ and Life’s Essential 8²⁴ may provide a simple way of recognizing higher-risk individuals, focusing on reducing modifiable risk factors and optimizing health behaviors.²⁵

Strategies to reduce the risk of developing HF should be individualized. In individuals at stage A with risk factors for HF such as diabetes or obesity, specific treatment options such as antihypertensive medications and treatments for diabetes^{26,27} and obesity,²⁸ including sodium-glucose-transporter-2 inhibitors, glucagon-like peptide-1-receptor agonists, and the nonsteroidal mineralocorticoid receptor antagonist finerenone (for those with chronic kidney disease and diabetes), have been shown to decrease the risk of developing new-onset HF. From stage A to B, there is a gradient of risk (individuals at stage B are at higher risk of short-term progression to overt HF); thus, more intensive proactive strategies are warranted in individuals at stage B such as treatment with some renin-angiotensin-aldosterone system inhibitors and β -blockers in individuals with asymptomatic left ventricular dysfunction.²⁹ Although optimal strategies for

Table 1. Stages in the Development and Progression of HF

Stage	Definition
At risk for HF (stage A)	Individuals at risk for HF but without current or prior symptoms or signs of HF and without structural cardiac changes or elevated biomarkers of heart disease At risk: individuals with hypertension, atherosclerotic cardiovascular disease, congenital heart disease, diabetes, obesity, exposure to cardiotoxins, a family history of cardiomyopathy, or genetic carriers at risk for cardiomyopathy Not all will develop HF, but risk factor intervention may be warranted
Pre-HF (stage B)	Individuals without current or prior symptoms or signs of HF with evidence of one of the following: Structural abnormalities: left ventricular hypertrophy, cardiac chamber enlargement, ventricular wall motion abnormality, myocardial tissue abnormality (eg, evidence of myocardial edema, scar/fibrosis abnormality by T2-weighted cardiac magnetic resonance imaging or late gadolinium enhancement imaging), valvular heart disease Abnormal cardiac function: reduced left or right ventricular systolic function, evidence of increased filling pressures (by invasive or noninvasive measures), abnormal diastolic function Elevated natriuretic peptide levels or elevated cardiac troponin levels, especially in the setting of exposure to cardiotoxins
HF (stage C)	Individuals with current or prior symptoms or signs of HF or both caused by a structural or functional cardiac abnormality or both
Advanced HF (stage D)	Severe symptoms or signs of HF or both at rest or with minimal exertion, recurrent hospitalizations despite GDMT, refractory or intolerant to GDMT, requiring advanced therapies such as inotropic support and consideration for cardiac transplantation, mechanical circulatory support, or palliative care

GDMT indicates guideline directed medical therapy; and HF, heart failure.

screening for HF risk have not been well established, data suggest that combining natriuretic peptide screening with other risk factors may identify individuals who can benefit from specific HF therapies even in a presymptomatic stage (stage B HF).^{30,31} Other biomarkers such as circulating troponin and urine albumin-creatinine ratio may further enhance population screening in higher-risk groups.^{32,33} A promising new screening approach uses artificial intelligence-enabled ECG, which accurately classifies and predicts left ventricular systolic dysfunction^{34,35} and structural cardiac disease³⁶ confirmed by echocardiography. For those without left ventricular systolic dysfunction, a positive artificial intelligence-enabled ECG test is strongly associated with incident HF in the future.³⁷ However, before these tools become clinically useful, further studies are required to demonstrate their impact in different population groups and on individual outcomes and the feasibility of implementation in clinical practice, especially in resource-limited areas.

Phenotypes of HF

The phenotypic classification of HF has traditionally been based on LVEF and cause.

Classification of HF According to LVEF

LVEF is the key criterion on which HF trial eligibility has been anchored for decades. Despite limitations, classification of HF by LVEF is fundamental for extrapolating efficacy from clinical trials to effectiveness in clinical practice, determining appropriate HF medications/devices, understanding the expected response to therapy, and monitoring individuals with HF. However, the LVEF cutoffs used in the first Universal Definition of Heart Failure were arbitrary, with the known variability of echocardiographic measurements of LVEF, difficulties in interpreting LVEF measured with different imaging modalities, and remaining debate over whether LVEF cutoffs should account for differences by sex, age, and ethnicity.^{1,38,39} There is growing evidence that individuals with slightly depressed LVEF may benefit from standard therapies for HF with reduced EF, calling for consideration of whether HF with lower LVEFs should be grouped under HF with reduced EF. Furthermore, HF with higher LVEFs should likely be best called HFpEF.^{39,40}

The lower limit of normal LVEF is $\approx 53\%$ for women and 52% for men, with slightly higher thresholds among individuals of Asian origin. An LVEF $< 50\%$ is thus unlikely to reflect normal function, regardless of sex, age, or self-reported race and ethnicity.⁴¹ This Second Universal Definition of Heart Failure therefore, moves away from using specific LVEF cutoffs and simplifies the classification to clinically actionable groups:

- HF with reduced EF;
- HFpEF; and
- HF with improved EF, HF with previously reduced LVEF that has now increased/normalized.

The revised simplified grouping facilitates clinical application and allows the clinician to account for potential differences in LVEF by sex, age, and ethnicity in the classification. For instance, the exact LVEF cutoff classifying an individual as having a reduced EF (with potential benefit from HF with reduced EF treatments) may not be identical in every case.

Classification of HF by Cause

The importance of making every effort to diagnose and define the specific cause of HF was emphasized in the first Universal Definition of Heart Failure. In clinical practice, the cause of HF has often been placed into just 2 categories: ischemic and nonischemic cardiomyopathy. This simplistic categorization omits the many causes of dilated and hypertrophic cardiomyopathies and does not acknowledge the impact of identifying specific causes on treatment. Identifying specific treatable causes will guide targeted treatment selection beyond standard HF treatment approaches. A prime example is an individual with cardiac amyloidosis as the underlying cause of HF, who will benefit from targeted treatment of cardiac amyloidosis beyond conventional HF therapies.

Several classifications of HF causes have been proposed (Table 2).^{9,10,42} A systematic review of trials and observational evidence of primary HF prevention across 92 putative HF pathogenic risk factors from US and European clinical practice guidelines showed that prognosis in HF depended on the specific causes and number of underlying risk factors and that almost 85% of individuals with HF had at least 1 identifiable pathogenic risk factor amenable to preventive treatment in the 5 years preceding diagnosis.⁴³ Note that there is substantial variability in case definitions of HF causes used across real-world registries and clinical trials, potentially leading to inconsistencies in primary data collection and challenges with generalization of trial results.⁴² To address this, a universal definition of causes in HF is proposed (Table 3).

Classifying cardiomyopathies remains complex because some diseases fit into multiple categories and their characteristics can evolve over time. The detailed subclassification of primary cardiomyopathies is beyond the scope of this document. Cardiomyopathies were first classified in 1980 as diseases affecting the heart muscle, categorized into dilated, hypertrophic, restrictive, arrhythmogenic right ventricular, and unclassified types. In 1996, the World Health Organization expanded this classification by recognizing inflammatory and viral cardiomyopathies as distinct conditions.⁴⁴ As understanding of pathophysiological mechanisms progressed, other classification systems emerged such as the American Heart Association's approach, which categorized cardiomyopathies into primary (affecting only the heart) and secondary (involving systemic diseases such as amyloidosis or diabetes).⁴⁵ The European Society of Cardiology organized cardiomyopathies based on morphological

Table 2. Selected Recently Proposed Classifications of HF by Cause

Classification (reference)	Pathogenic classes
European Society of Cardiology HF guidelines 2021 ⁹	Coronary artery disease; hypertension; valve disease; arrhythmias; cardiomyopathies; congenital heart disease, infective, drug induced, infiltrative; storage disorders; endomyocardial disease; pericardial disease, metabolic; neuromuscular disease
American Heart Association/American College of Cardiology/Heart Failure Society of America HF guidelines 2022 ¹⁰	Ischemic heart disease and myocardial infarction; hypertension; valvular heart disease; familial or genetic cardiomyopathies; amyloidosis; cardiotoxicity with cancer or other treatments or substance abuse such as alcohol, cocaine, or methamphetamine; tachycardia, right ventricular pacing, or stress-induced cardiomyopathies; peripartum cardiomyopathy; myocarditis; autoimmune causes, sarcoidosis; iron overload, including hemochromatosis; thyroid disease and other endocrine metabolic; nutritional
Global Burden of Disease ⁴²	Ischemic cardiomyopathy; pressure overload of the left side of the heart; pulmonary heart disease; valvular and congenital cardiomyopathy; primary myocardial disease; toxic cardiomyopathy; infectious disease; stress, tachycardias, and high-output mediated cardiomyopathy; volume-overload syndromes; other causes

HF indicates heart failure.

and functional characteristics and further divided them into familial and nonfamilial types.⁴⁶ More recently, the MOGE(S) system was introduced, incorporating morpho-functional phenotype (M), organ involvement (O), genetic inheritance pattern (G), etiologic annotation (E) including genetic defect or underlying disease/substrate, and the functional status (S) of the disease.⁴⁷

It is important to note that the proposed universal classification of HF by causes aims to facilitate standardized reporting of HF causes in both clinical and research settings. The consideration of key HF causes encour-

ages targeted application of appropriate diagnostic and treatment strategies that prevent the development and progression of HF in individuals with specific identifiable causes. Of note, the pathogenic classification is independent of LVEF. With advancements in deep phenotyping, specific examples may be reclassified with better understanding of the underlying pathogenic processes; for instance, some forms of idiopathic cardiomyopathy may be reclassified as genetic/familial cardiomyopathy as underlying genetic variants are discovered. The list of causes (Table 3) represents common examples and is

**Table 3. Proposed Universal Classification of HF by Cause**

Pathogenic group	Specific examples
Ischemic cardiomyopathy	Ischemic heart disease, myocardial infarction, coronary artery disease
Hypertensive cardiomyopathy	Hypertensive heart disease
Valvular cardiomyopathy	Structural valve disease: calcific aortic valve disease, degenerative mitral valve disease, other nonrheumatic and congenital valvular diseases, rheumatic heart disease
Arrhythmia-related cardiomyopathy	Atrial fibrillation (uncontrolled), tachycardia, dyssynchrony, or premature ventricular contraction-induced cardiomyopathy, right ventricular pacing-induced cardiomyopathy, desmoplakin
Infiltrative cardiomyopathy	Cardiac amyloidosis, hemochromatosis, Fabry disease, glycogen storage disease, neoplastic/cancer-related infiltration
Infective cardiomyopathy	Viral myocarditis, Chagas disease, HIV, Lyme disease
Inflammatory cardiomyopathy	Autoimmune disease, sarcoidosis, hypersensitivity, desmoplakin
Toxic cardiomyopathy	Medication-induced cardiotoxicity, substance use disorders, for example, alcohol, cocaine, amphetamine
Heritable cardiomyopathy	Hypertrophic cardiomyopathy, dilated cardiomyopathy, restrictive cardiomyopathy, arrhythmogenic cardiomyopathy, nondilated left ventricular cardiomyopathy
Pericardial disease	Constrictive and restrictive pericarditis
Metabolic disease and nutritional deficiency-associated cardiomyopathy	Obesity; diabetes; endocrine disorders, for example, thyroid disease; nutritional disease, for example, thiamine, vitamin B ₁₂ , and selenium deficiencies; inborn errors of metabolism
Pregnancy-related cardiomyopathy	Peripartum cardiomyopathy
Stress-induced cardiomyopathy	Takotsubo cardiomyopathy
Pulmonary/right-sided heart disease	Chronic obstructive pulmonary disease, interstitial lung disease, coal workers' pneumoconiosis, silicosis, asbestosis, other pneumoconiosis, pulmonary arterial hypertension
Congenital cardiomyopathy	Systemic right ventricular failure, Fontan circulation, repaired tetralogy of Fallot
High-output mediated cardiomyopathy	Hemoglobinopathies, hemolytic anemias, atrioventricular malformations, endocrine causes (eg, pheochromocytoma)
Other causes	Other cardiovascular and systemic disorders, for example, neuromuscular disease, endomyocardial fibrosis, Loeffler endocarditis
Idiopathic	Idiopathic cardiomyopathy

HF indicates heart failure.

not exhaustive. Some reversible causes can cause transient/acute rather than chronic HF; this is covered later in the Mode of Presentation section.

Geographic Variation

With increasing global migration and industrialization, the spectrum of cardiovascular disease (CVD) contributing to HF is changing globally. The spectrum of CVD leading to HF differs significantly between high-income and low- to middle-income countries.⁴⁸ As a result of conflict, poverty, and environmental factors, migration to industrialized countries (particularly to those of the Global North) has escalated over the past 2 decades; consequently, the profile of CVD in host countries has changed considerably.⁴⁹ It has been found that up to 3% of immigrants arriving in Europe have underlying cardiac disease.⁵⁰ Migrant populations could present with CVDs that are unfamiliar to health care workers practicing in Global North countries that include rheumatic heart disease, Chagas disease, endomyocardial fibrosis, tuberculous pericarditis, or peripartum cardiomyopathy. On the other hand, physicians practicing in low-income countries need to adapt to the increase in CVD linked to the so-called Western lifestyle such as coronary artery disease and myocardial infarction, which have previously contributed to <10% of all HF cases in large cohort studies from South Africa⁵¹ and Nigeria⁵² published within the past 2 decades.

A systematic review of worldwide risk factors for HF⁵³ found that ischemic heart disease was the major risk factor for HF in >50% of individuals in Western high-income regions, as well as Eastern and Central European regions. In contrast, it contributed to 30% to 40% of HF cases in East Asia, high-income Asia Pacific regions, Latin America, and the Caribbean. At the lowest end of the scale, in sub-Saharan Africa, ischemic heart disease contributed to <10% of cases. Hypertension was a common contributor in Eastern and Central Europe (35%; range, 32.7%–37.3%) and sub-Saharan Africa (32.6%; range, 29.6%–35.7%). Of the other 2 commonly reported antecedents, rheumatic heart disease was particularly prevalent in East Asia (34%) and sub-Saharan Africa (14%) cases.

Another systematic analysis of the underlying causes of HF in 195 countries and territories from 1990 to 2017 showed significant geographic and sociodemographic variation.⁵⁴ Globally, ischemic heart disease accounted for the highest proportion (26.5%) of the age-standardized prevalence rate of HF in 2017, followed by hypertensive heart disease (26.2%) and chronic obstructive pulmonary disease (23.4%). However, chronic obstructive pulmonary disease accounted for the highest proportion of age-standardized prevalence rate of HF in South Asia (38.3%) and East Asia (34.3%). Alcoholic cardiomyopathy was a major cause of HF in Eastern Europe, accounting for 16.4% of age-standardized prevalence rate of HF. Chagas disease was a major cause of HF in Andean

(7.4%), tropical (6.5%), central (3.5%), and southern (9.4%) Latin America but had almost no impact on HF in other regions.

Geographic variation by LVEF subgroup in the characteristics and contributing factors for individuals has also been described.⁵⁵ Individuals from lower- and middle-income regions present with HF at a considerably younger age compared with those from high-income regions, and region-specific phenotypes include lean diabetic HFpEF in Southeast Asia, Chagas disease in Latin America, and hypertensive heart disease and peripartum cardiomyopathy in Africa. Socioeconomic determinants such as country income level and out-of-pocket costs may contribute to geographic differences, but the full extent of the influence of socioeconomic determinants on presentation, management, and outcomes of HF remains poorly understood. There remains a shortage of high-quality data on HF prevalence, causes, and outcomes in many low- and middle-income countries. This gap limits global generalizability of current trial evidence underscored by recent analyses, including the near absence of sub-Saharan African participants in HF trials.⁵⁶

It is important to note that the geographic variation of pathology contributing to HF has implications for the interpretation and generalizability of clinical trial results, design and conduct of future studies, and optimal care for individuals around the world.

Trajectories of HF

HF is a dynamic clinical syndrome with changing clinical trajectory over time based on symptoms, signs, and disease progression or remission (Figure). Recent guidelines emphasize early identification of HF and targeted interventions, including guideline-directed medical therapy, to alter disease progression.⁵⁷

Optimal HF therapy may induce substantial improvement in cardiac function over time. Patients with HF with improved EF, characterized by antecedent HF with reduced EF and a subsequent ≥ 10 -point increase in LVEF to a new LVEF >40%, illustrate the dynamic nature of HF. However, an exclusively LVEF-based definition insufficiently reflects the broader HF phenotype given the intrinsic variability of LVEF measurement and the frequent persistence of structural abnormalities, biomarker elevation, or residual symptoms.⁵⁷

A more holistic, HF-oriented framework encompassing improvement, remission, and recovery may better characterize these trajectories. Improvement denotes LVEF improvement despite ongoing structural or clinical abnormalities. Remission involves normalized LVEF with minimal symptoms and stable biomarker profiles while acknowledging persistent vulnerability to relapse. Only a minority reach recovery, defined by sustained normalization of cardiac structure, function, biomarkers, and symptoms over extended follow-up.⁵⁷



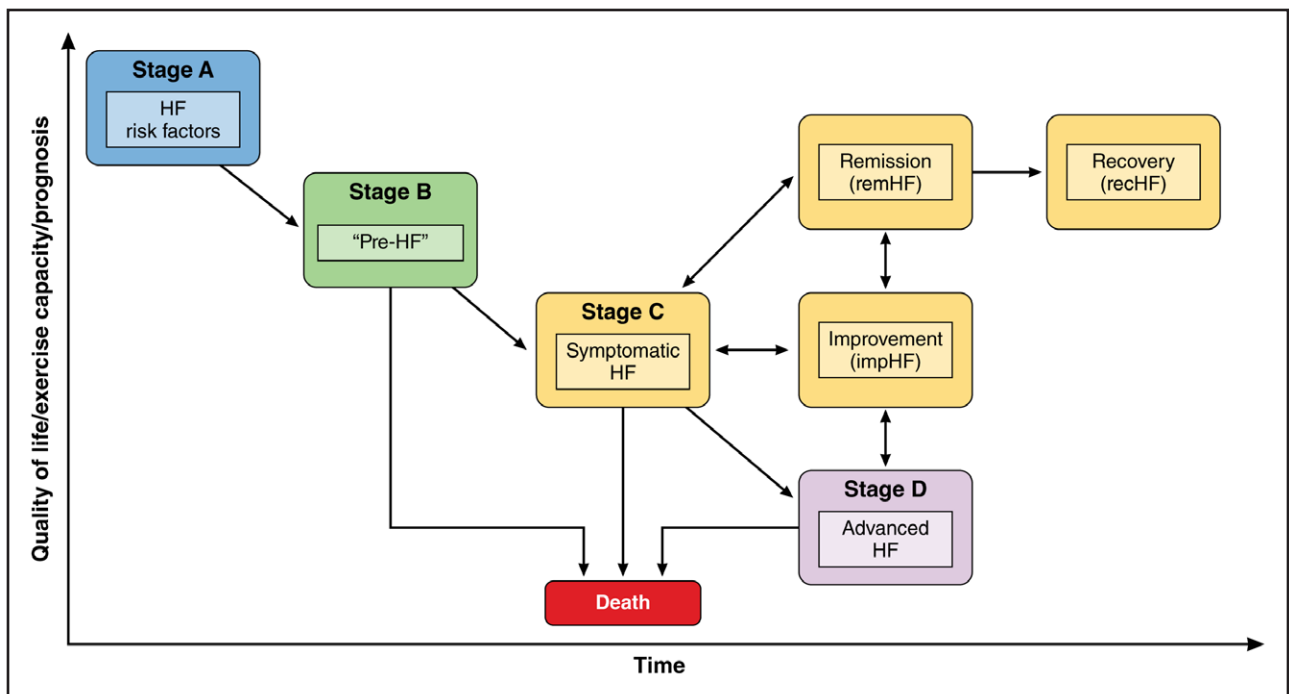


Figure. Trajectories of HF.

An individual's heart failure (HF) journey starts left to right, and quality of life or exercise capacity and prognosis become poor as HF stage advances. Every stage carries certain risk of sudden death.

This continuum reinforces that LVEF improvement alone does not signify disease resolution. Patients with HF with improved EF remain susceptible to recurrent left ventricular dysfunction and therefore require continued guideline-directed medical therapy and longitudinal clinical surveillance. In select asymptomatic or minimally symptomatic individuals (New York Heart Association class I), a state of HF in remission may be observed, indicating stable but not definitive recovery.

This term is distinct from the misnomer stable HF because individuals with HF always have a residual risk for worsening symptoms, hospitalization, or sudden cardiac death. Individuals with HF who have recurrent hospitalizations and continue to decline despite escalation in therapy are noted to have refractory HF (stage D). These individuals are assessed for advanced therapies, including mechanical circulatory support, cardiac transplantation, and palliative care.

WORSENING HF

Worsening HF represents a pivotal event in the progression of HF and is associated with an unfavorable clinical prognosis. It is characterized by a progressive deterioration in both the symptoms and signs of HF and quality of life in individuals with a prior diagnosis of HF.^{58,59} By definition, worsening HF necessitates a prior diagnosis of HF, thereby excluding new-onset HF cases. It also excludes symptom worsening attributed primarily to precipitating events unrelated to HF progression such as

acute coronary syndromes, infections, or poor adherence to treatment.^{58,59}

The clinical definition of worsening HF encompasses a range of manifestations, including exacerbation of dyspnea and peripheral edema. Worsening HF may also involve the deterioration of related clinical parameters such as malignant arrhythmias, diminished exercise capacity, and subclinical changes indicative of HF severity, including elevated pulmonary pressures, impaired ventricular function (right or left) identified through imaging, and increased levels of biomarkers such as BNP, NT-BNP, and cardiac troponins. Such changes are linked to poorer outcomes.^{60–62}

Worsening HF often precipitates unplanned medical interventions, including outpatient and emergency department visits or hospital admissions. However, these health care encounters are not prerequisites for the diagnosis of worsening HF.

Decompensated HF

Worsening HF can include progression to decompensated HF (DHF), a condition defined by the need for escalated care or rescue therapy.^{63,64} However, DHF can occur at any time in the HF disease course and is not limited to those with worsening HF. Unlike worsening HF, which represents an event in HF progression, DHF is specifically characterized by the requirement for treatment modification, often during a hospitalization.

DHF may present as either a gradual clinical deterioration over days to weeks, commonly observed in chronic

HF, or an acute episode such as acute pulmonary edema or cardiogenic shock.^{9,10}

The defining feature of DHF is the necessity for treatment intensification, which typically involves an increase in diuretic dose, the initiation of combination diuretic therapy, and, if not already present, implementation of guideline-directed medical therapy. In more severe cases, further advanced interventions, including escalation of medical therapy, resynchronization therapy, valvular interventions, mechanical circulatory support, or heart transplantation, may be required.⁶⁴ It is important to note that the subset of individuals meeting DHF criteria represents a more severe progression of worsening HF, with clinical changes demanding therapeutic augmentation or rescue strategies.⁶³

The threshold for defining therapeutic escalation can vary according to regional clinical practices and health care resource availability, emphasizing the context-dependent nature of DHF management.

MODE OF PRESENTATION

Acute Presentations

Cardiovascular conditions precipitating acute HF commonly include acute myocardial infarction or acute coronary syndrome, hypertensive emergency, arrhythmias, and pulmonary embolism.

Individuals with acute myocardial infarction and acute coronary syndrome complicated by HF may recover with timely treatment strategies without progression to chronic HF, but some may progress to chronic HF. Specific trials have been conducted in this setting.^{29,65,66} Hypertensive emergencies encompass a spectrum of clinical presentations that can lead to acute left ventricular dysfunction, pulmonary edema, or both. Arrhythmia-induced cardiomyopathy encompasses tachycardiomyopathy, atrial fibrillation-induced cardiomyopathy, and premature ventricular ectopic beat-induced cardiomyopathy.^{67–69} Acute valvular heart diseases can cause HF, and pulmonary embolism can cause acute isolated right HF.

In addition, acute noncardiovascular diseases such as kidney injury, liver failure, and respiratory failure may lead to acute HF as a result of volume overload and neurohormonal compensatory mechanisms involved in some of these conditions. Symptoms and signs of HF typically resolve once the underlying primary cause is treated.

Chronic Presentation

Subacute or indolent presentations of HF are common. These are characterized by a gradual onset of symptoms that may evolve over weeks to months, often making initial diagnosis more challenging. Patients may experience subtle signs such as increasing fatigue, mild exertional dyspnea, or gradual weight gain caused by fluid reten-

tion rather than the dramatic symptoms seen in acute decompensation. Because these changes can be mistaken for deconditioning or normal aging, they may be overlooked by both patients and clinicians. Data from population studies demonstrate that substantial numbers of patients in primary care are treated with chronic diuretic therapy without a formal diagnosis of HF.⁷⁰ Randomized trial data support the use of natriuretic peptide screening to improve identification of chronic HF in primary care settings.^{30,31}

HF Mimics

HF mimics are conditions that are not consistent with an HF diagnosis and are not pathophysiologically dependent on neurohumoral activation that originates from the myocardium.

Coronary Artery Disease

In approximately half of the HF population (across the EF spectrum), HF is a consequence of coronary artery disease. Myocardial ischemia can serve as an HF mimic, as a condition occurring jointly with HF or a cause of DHF. Although chest discomfort is the leading symptom of chronic coronary syndromes, 10% to 15% of individuals report only exertional dyspnea.⁷¹ In scenarios in which chronic coronary syndromes and HF may coexist, determination of the impact of these 2 conditions on symptoms will depend on the clinical likelihood of obstructive coronary artery disease, in conjunction with 12-lead ECG and echocardiography, followed by further testing for obstructive and nonobstructive coronary artery disease. In parallel, HF diagnostic algorithms should be used to elucidate the contribution of HF to the symptoms.

Chronic Kidney Disease

Individuals with chronic kidney disease may develop dyspnea, exertional limitations, and peripheral edema resulting from inadequate diuresis or worsening disease, which could be accompanied by abnormalities of cardiac structure or function (eg, left atrial enlargement, left ventricular hypertrophy, or diastolic dysfunction secondary to hypertension) and elevated biventricular filling pressures.

Pregnancy

Dyspnea, exertional limitations, and peripheral edema also commonly occur in the third trimester of pregnancy. In this scenario, natriuretic peptides and echocardiography can be useful in excluding a myocardial cause for the presentation. Investigation to exclude peripartum cardiomyopathy or the unmasking of preexisting cardiomyopathy is crucial.

Obesity and Deconditioning

Obesity and deconditioning are often accompanied by dyspnea, exertional intolerance, and peripheral edema. Determining a myocardial cause for dyspnea can be

challenging with concurrent obesity as a result of reduced specificity of the physical examination and falsely normal natriuretic peptides even when HFpEF is present. Invasive exercise hemodynamics may be key to determining whether HF is present.

CONCLUSIONS

The diagnosis and treatment of individuals with HF is an evolving field of research, clinical practice, and a deeper understanding of the diverse phenotypes and cause that characterize this complex syndrome. The Second Universal Definition of Heart Failure builds on the foundational work of the first definition by refining the definitions of HF stages, emphasizing the importance of early detection and individualized risk reduction, and introducing a universal classification of HF causes, as well as acknowledging geographic variation of causes.

A major advancement in this update is the move away from LVEF cutoff values, instead advocating for clinically actionable groupings that better reflect the spectrum of HF presentations and allow more personalized care. The recognition of HF trajectories—improvement, remission, and recovery—underscores the dynamic nature of the disease and the need for ongoing surveillance and tailored therapy, even for patients who demonstrate significant improvement.

This document also highlights the profound impact of social determinants and geographic variation on HF risk, presentation, and outcomes. Addressing these disparities is essential for achieving equitable care and improving global health outcomes. The inclusion of a comprehensive table on HF causes provides a valuable tool for clinicians and researchers, facilitating targeted diagnostic and therapeutic strategies.

Last, the recognition of HF mimics and the importance of distinguishing them from true HF syndromes reinforce the need for vigilance and a holistic approach to patient assessment. As our understanding of HF continues to grow, this universal definition serves as a living framework, one that will adapt with future discoveries and innovations, always with the goal of improving patient care and outcomes.

DOCUMENT REVIEWERS

Albania: Albanian Society of Cardiology, Albana Doko Banushi; Algeria: Algerian Society of Cardiology, Brahim Kichou; Armenia: Armenian Cardiologists Association, Hamayak S. Sisakian; Austria: Austrian Society of Cardiology, Noemi Pavo; Azerbaijan: Azerbaijan Society of Cardiology, Ulvi Mirzoyev; Belgium: Belgian Society of Cardiology, Ana Roussoulières; Bulgaria: Bulgarian Society of Cardiology, Vassil Traykov; Croatia: Croatian Cardiac Society, Nina Jakus; Cyprus: Cyprus Society of Cardiology, Constantinos Ergatoudes; Czechia: Czech

Society of Cardiology, Anna Chaloupka; Denmark: Danish Society of Cardiology, Henrik Wiggers; Egypt: Egyptian Society of Cardiology, Azza Farrag; Estonia: Estonian Society of Cardiology, Pentti Pöder; France: French Society of Cardiology, Damien Logeart; Georgia: Georgian Society of Cardiology, Vaja Agladze; Greece: Hellenic Society of Cardiology, Katerina K. Naka; Hungary: Hungarian Society of Cardiology, Annamaria Kosztin; Iceland: Icelandic Society of Cardiology, Inga J. Ingimarsdottir; Ireland: Irish Cardiac Society, Helen Cooney; Israel: Israel Heart Society, Rabea Asleh; Italy: Italian Federation of Cardiology, Savina Nodari; Kyrgyzstan: Kyrgyz Society of Cardiology, Erkin Mirrakhimov; Latvia: Latvian Society of Cardiology, Ginta Kamzola; Lebanon: Lebanese Society of Cardiology, Hadi Skouri; Libya: Libyan Cardiac Society, Mohamed El-Harari; Luxembourg: Luxembourg Society of Cardiology, Steve Huijnen; Morocco: Moroccan Society of Cardiology, Ahmed Bennis; Netherlands: Netherlands Society of Cardiology, Vanessa van Empel; North Macedonia: National Society of Cardiology of North Macedonia, Marija Vavlukis; Poland: Polish Cardiac Society, Agnieszka Kołodzińska; Portugal: Portuguese Society of Cardiology, Susana Dias da Costa; Romania: Romanian Society of Cardiology, Elena-Laura Antohi; San Marino: San Marino Society of Cardiology, Marina Foscoli; Slovenia: Slovenian Society of Cardiology, Mitja Lainscak; Spain: Spanish Society of Cardiology, Sonia Mirabet Perez; Sweden: Swedish Society of Cardiology, Gabriel Arefalk; Switzerland: Swiss Society of Cardiology, Philippe Meyer; Tunisia: Tunisian Society of Cardiology and Cardiovascular Surgery, Leila Abid; Türkiye: Turkish Society of Cardiology, Ozlem Yildirimturk; Turkmenistan: Turkmen Committee of Cardiologists, Bahram Kadyrov; United Kingdom of Great Britain and Northern Ireland: British Cardiovascular Society, Lisa Anderson.

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ARTICLE INFORMATION

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Disclosures

Writing Group Disclosures

Writing group member	Employment	Research grant	Other research support	Speakers' bureau/honoraria	Expert witness	Ownership interest	Consultant/advisory board	Other
Mary N. Walsh	Ascension St. Vincent Heart Center	None	None	None	None	None	None	None
Lars Køber	Rigshospitalet, Copenhagen University Hospital (Denmark)	None	None	AstraZeneca*; Bayer*; Boehringer Ingelheim*; Novartis*; Novo Nordisk*	None	None	None	None
Karen Hahnle-Sliwa	Cape Heart Institute (South Africa)	None	None	None	None	None	None	None
Marianna Adamo	Institute of Cardiology, ASST Spedali Civili, Department of Medical and Surgical Specialties, Radiological Sciences and Public Health, University of Brescia (Italy)	None	None	None	None	None	None	None
Anubha Agarwal	Washington University in St. Louis School of Medicine	NIH (R00HL157687, R33HL139852)†; Washington University in St. Louis†	None	None	None	HFrEF polypill patent pending†	None	None
Amitava Banerjee	University College London Institute of Health Informatics (United Kingdom)	None	None	None	None	None	None	None
Biykem Bozkurt	Baylor College of Medicine	None	None	None	None	None	ABIOMED/ Johnson and Johnson*; AstraZeneca*; Bayer*; Bristol Myers Squibb*; Boehringer Ingelheim*; Cardurion*; Cytokinetics*; Eli Lilly*; Medtronic*; Merck*; Idorsia*; Novo Nordisk*; Regeneron*; Renova-cor*; Roche*; Salubris*; Sanofi-Aventis*; scPharmaceuticals*; Vasa Therapeutics (DSMC) Vifor*; Respocardia/Zoll*	None
Maja Cikes	Sveuciliste u Zagrebu Medicinski fakultet Department for Cardiovascular Diseases (Croatia)	Novartis (Investigator-Initiated Research Grant to institution)*; Novo Nordisk (Clinical Study Contract with institution)*; CorVia (Clinical Study Contract with institution)*	None	Abbott*; Bayer*; Novo Nordisk†; Pfizer*; Medscape†	None	None	Bayer*; Boehringer-Ingelheim*; Novo Nordisk*; Biogen*; Astra Zeneca (Steering committee member)*; Novo Nordisk (Steering committee member)†; Cortesia (Steering committee member)*	None
Albertino Damasceno	Universidade Eduardo Mondlane (Mozambique)	None	None	None	None	None	None	None

(Continued)

Writing Group Disclosures (Continued)

Writing group member	Employment	Research grant	Other research support	Speakers' bureau/ honoraria	Expert witness	Ownership interest	Consultant/advisory board	Other
Akshay Desai	Brigham and Women's Hospital	Alnylam (institutional grant to BWH)†; AstraZeneca (institutional grant to BWH)†; Bayer (institutional grant to BWH)†; Avalyn Pharma (institutional grant to BWH)†; Pfizer (institutional grant to BWH)†; Intellia Therapeutics (institutional grant to BWH)†; Pharmacosmos (institutional grant to BWH)†	None	None	None	None	Abbott*; Alnylam†; AstraZeneca†; Avidity Bioscience†; Axon Therapies*; Bayer†; Biofourmis*; CVS Caremark†; Corsera Health*; Coteria Therapeutics*; Edwards Lifesciences†; Endotronix†; iRhythm Technologies*; Medpacet; New Amsterdam†; Novartis*; Regeneron*; River2Renal†; Roche†; scPharma*; Tevat; Vectorious Medical Technologies†; Verve Therapeutics†; Volta Medical†; Whiteswell*	None
G. Michael Felker	Duke University Duke Clinical Research Institute	Cytokinetics (research grant to Duke)†; BMS (research grant to Duke)†; Bayer (research grant to Duke)†	None	None	None	None	Merck*; Boehringer Ingelheim†; Whiteswell*; Novartis*; River2Renal*	None
Gail Hogan	Retired	None	None	None	None	None	None	None
Koichiro Kinugawa	University of Toyama, Second Department of Internal Medicine (Japan)	None	None	None	None	None	None	None
Michelle Kittleson	Cedars Sinai Smidt Heart Institute	None	None	None	None	None	None	None
Carolyn Lam	Duke–National University of Singapore Graduate Medical School (Singapore)	Roche (principal investigator, Cardiovascular Clinical Trials in Asia: Asian Diabetes Outcomes Prevention Trial [ADOPT])†; Novo Nordisk (principal investigator, Clinical, imaging and biomarker exploration in HFpEF Patients from ATTRaCT cohort[s])†; National Medical Research Council of Singapore (principal investigator, Heart Failure Screening in Primary Care Using Digital Tools)†	None	None	None	Us2.a†	Alnylam Pharma*; Ana-Cardio AB*; Applied Therapeutics*; AstraZeneca*; Boehringer Ingelheim*; Bristol Myers Squibb*; Coteria*; CPC Clinical Research*; Cytokinetics*; Impulse Dynamics*; Intellia Therapeutics*; Klyv Therapeutics*; Medscape*; Merck*; Pfizer*; Radcliffe*; Ribocure*; Roche*; Bayer†; Boston Scientific†; Eli Lilly†; Janssen R&D†; Novartis†; Novo Nordisk†; Us2.a†	None
Theresa McDonagh	King's College Hospital (United Kingdom)	None	None	Boehringer Ingelheim*	None	None	None	None
Marco Metra	Cardiology, IRCCS San Raffaele Scientific Institute and Vita-salute University Milan (Italy)	None	None	Boehringer Ingelheim*; Zoll Therapeutics*; Tenax Therapeutics*	None	None	Bayer*; Eli Lilly*; Novo-Nordisk*; Astra-Zeneca (Steering Committee member)*	None
Wilfried Mullens	Ziekenhuis Oost-Limburg (Belgium)	None	None	None	None	None	None	None
Antonio Ribeiro	Department of Internal Medicine, Faculdade de Medicina, and Telehealth Center and Cardiology Service, Hospital das Clinicas, Universidade Federal de Minas Gerais, Belo Horizonte (Brazil)	None	None	None	None	None	None	None

(Continued)

Writing Group Disclosures (Continued)

Writing group member	Employment	Research grant	Other research support	Speakers' bureau/ honoraria	Expert witness	Ownership interest	Consultant/advisory board	Other
Yolanda Vaughn	Tennessee Board of Regents	None	None	None	None	None	None	None
Amanda Vest	Cleveland Clinic	NIH (R01 and RCs2 grants)†	None	None	None	None	None	None

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*Modest.

†Significant.

Reviewer Disclosures

Reviewer	Employment	Research grant	Other research support	Speakers' bureau/ honoraria	Expert witness	Ownership interest	Consultant/ advisory board	Other
Johann Bauersachs	Hannover Medical School (Germany)	CVRx*; Roche Diagnostics*; Norgine (investigator iron deficiency in heart failure)†; Zoll*	None	Boehringer Ingelheim†; Bayer†; BMSt; AstraZeneca†; Cardior*; CVRx*; Abbott*; Edwards*; Zoll*; Pfizer*; Novartis*	None	None	None	None
Jan Biegus	University Clinical Hospital in Wrocław, Institute of Heart Diseases, Wrocław Medical University (Poland)	None	None	None	None	None	None	None
Barry A. Borlaug	Division of Cardiology, Mayo Clinic	None	None	None	None	None	None	None
Khadijah Breathett	Indiana University Division of Cardiology	NHLBI (advanced heart failure)†	None	None	None	None	<i>Circulation: Population Health and Outcomes</i> associate editor†	None
Erwan Donal	CHU de Rennes (France)	General Electric Healthcare*	None	Abbott (speaker fees)*; Pfizer (speaker fees)*; Alnylam (speaker fees)*	None	None	None	None
Michael M. Givertz	Brigham and Women's Hospital	None	None	None	None	None	None	None
Eva Goncalvesova	National Institute of Cardiovascular Diseases (Slovakia)	None	None	Novartis*; Bayer*; Boehringer Ingelheim*; AstraZeneca*; Pfizer*; AOP*; Novo Nordisk*; Amgen*	None	None	Servier*; Boehringer Ingelheim*; Bayer*	None
Takeshi Kitai	National Cerebral and Cardiovascular Center (Japan)	None	None	None	None	None	None	None
Sarah M. Kraus	University of Cape Town (South Africa)	None	None	Sanofi African Rare Disease Summit (June 2025)*	None	None	Heart Failure Society of South Africa (HeFSSA)–Executive Committee member (uncompensated)*	None
Xinli Li	The First Affiliated Hospital With Nanjing Medical University (China)	None	None	None	None	None	None	None
Seema Mital	The Hospital for Sick Children (Canada)	None	None	None	None	None	Bristol Myers Squibb*; Tenaya Therapeutics*; Rocket Pharmaceuticals*	None
Pablo Perel	World Heart Federation	None	None	None	None	None	None	None

(Continued)

Reviewer Disclosures (Continued)

Reviewer	Employment	Research grant	Other research support	Speakers' bureau/ honoraria	Expert witness	Ownership interest	Consultant/ advisory board	Other
Nancy K. Sweitzer	Washington University School of Medicine in St. Louis	None	None	None	None	None	None	None
Jasper Tromp	National University of Singapore and National University Health System (Singapore)	AstraZeneca (research support for health economic analysis)†	None	None	None	Us2.ai*	Us2.ai*; Roche Diagnostics*	None
Eleanor Wicks	Oxford University (England)	None	None	None	None	None	None	None

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†Significant.

REFERENCES

1. Bozkurt B, Coats AJ, Tsutsui H, Abdelhamid M, Adamopoulos S, Albert N, Anker SD, Atherton J, Bohm M, Butler J, et al. Universal definition and classification of heart failure: a report of the Heart Failure Society of America, Heart Failure Association of the European Society of Cardiology, Japanese Heart Failure Society and Writing Committee of the Universal Definition of Heart Failure. *J Card Fail*. 2021;27:387–413. doi: 10.1002/ejhf.2115

2. Bozkurt B, Ahmad T, Alexander KM, Baker WL, Bosak K, Breathett K, Fonarow GC, Heidenreich P, Ho JE, Hsieh E, et al. Heart failure epidemiology and outcomes statistics: a report of the Heart Failure Society of America. *J Card Fail*. 2023;29:1412–1451. doi: 10.1016/j.cardfail.2023.07.006

3. Blecker S, Paul M, Taksler G, Ogedegbe G, Katz S. Heart failure–associated hospitalizations in the United States. *J Am Coll Cardiol*. 2013;61:1259–1267. doi: 10.1016/j.jacc.2012.12.038

4. Khan SS, Berwanger O, Fiazat M, McMurray JJV, Narula J, Prabhakaran D, Sliwa K, Tromp J, Vaduganathan M. Prioritising the primary prevention of heart failure. *Lancet*. 2025;406:1138–1153. doi: 10.1016/S0140-6736(25)01393-5

5. Palaniappan LP, Allen NB, Almarzooq ZI, Anderson CAM, Arora P, Avery CL, Baker-Smith CM, Bansal N, Currie ME, Earlie RS, et al. 2026 Heart disease and stroke statistics: a report of US and global data from the American Heart Association. *Circulation*. 2026;153:e275–e906. doi: 10.1161/CIR.0000000000001412

6. Piña IL, Jimenez S, Lewis EF, Morris AA, Onwuanyi A, Tam E, Ventura HO. Race and ethnicity in heart failure. *J Am Coll Cardiol*. 2021;78:2589–2598. doi: 10.1016/j.jacc.2021.06.058

7. Tromp J, Ouwerkerk W, Teng T-HK, Cleland JGF, Bamadaj S, Angermann CE, Dahlstrom U, Tay WT, Dickstein K, Ertl G, et al. Global disparities in prescription of guideline-recommended drugs for heart failure with reduced ejection fraction. *Eur Heart J*. 2022;43:2224–2234. doi: 10.1093/eurheartj/ehac103

8. Thygesen K, Alpert JS, Jaffe AS, Chaitman BR, Bax JJ, Morrow DA, White HD; the Executive Group on behalf of the Joint European Society of Cardiology (ESC)/American College of Cardiology (ACC)/American Heart Association (AHA)/World Heart Federation (WHF) Task Force for the Universal Definition of Myocardial Infarction. Fourth Universal Definition of Myocardial Infarction (2018) [published correction appears in *Circulation*. 2024;149:e1164]. *Circulation*. 2018;138:e652. doi: 10.1161/CIR.0000000000000617

9. McDonagh TA, Metra M, Adamo M, Gardner RS, Baumbach A, Böhm M, Burri H, Butler J, Čelutkienė J, Chioncel O, et al; ESC Scientific Document Group. 2021 ESC guidelines for the diagnosis and treatment of acute and chronic heart failure. *Eur Heart J*. 2021;42:3599–3726. doi: 10.1093/eurheartj/ehab368

10. Heidenreich PA, Bozkurt B, Aguilar D, Allen LA, Byun JJ, Colvin MM, Deswal A, Drazner MH, Dunlay SM, Evers LR, et al. 2022 AHA/ACC/HFSA guideline for the management of heart failure: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2022;145:e895–e1032. doi: 10.1161/CIR.0000000000001063

11. Anjan VY, Loftus TM, Burke MA, Akhter N, Fonarow GC, Gheorghiade M, Shah SJ. Prevalence, clinical phenotype, and outcomes associated with normal B-type natriuretic peptide levels in heart failure with preserved ejection fraction. *Am J Cardiol*. 2012;110:870–876. doi: 10.1016/j.amjcard.2012.05.014

12. Verbrugge FH, Omote K, Reddy YNV, Sorimachi H, Obokata M, Borlaug BA. Heart failure with preserved ejection fraction in patients with normal natriuretic peptide levels is associated with increased morbidity and mortality. *Eur Heart J*. 2022;43:1941–1951. doi: 10.1093/eurheartj/ehab911

13. Poppe KK, Dougherty RN, Gardin JM, Hobbs FDR, McMurray JJV, Nagueh SF, Senior R, Thomas L, Whalley GA, Aune E, et al. Ethnic-specific normative reference values for echocardiographic LA and LV size, LV mass, and systolic function: the EchoNoRMAL study. *JACC Cardiovasc Imaging*. 2015;8:656–665. doi: 10.1016/j.jcmg.2015.02.014

14. Bozkurt B. Pre-heart failure: an important opportunity to prevent a deadly disease. *JACC Heart Fail*. 2023;11:1027–1031. doi: 10.1016/j.jchf.2023.07.001

15. Upadhyay B, Hegde S, Tannu M, Stacey RB, Kalogeropoulos A, Schocken DD. Preventing new-onset heart failure: intervening at stage A. *Am J Prev Cardiol*. 2023;16:100609. doi: 10.1016/j.ajpc.2023.100609

16. Heidemann AL, Santos ABS, Bittencourt MS, Ribeiro ALP, Rohde LE, Lotufo PA, Duncan BB, Foppa M. Prevalence and mortality of heart failure stages in a free-living older adult population: data from the Brazilian Longitudinal Study of Adult Health. *J Am Heart Assoc*. 2025;14:e038993. doi: 10.1161/JAHA.124.038993

17. Taylor CJ, Beezer J, Fuat A, Halliday BP, Ludman AJ, Pellicori P, Savage HO, Cleland JGF. Predicting and preventing heart failure. *Considerations Med*. 2024;3:e000007. doi: 10.1136/conmed-2024-000007

18. White-Williams C, Rossi LP, Bittner VA, Driscoll A, Durant RW, Granger BB, Graven LJ, Kitko L, Newlin K, Shirey M; on behalf of the American Heart Association Council on Cardiovascular and Stroke Nursing; Council on Clinical Cardiology; and Council on Epidemiology and Prevention. Addressing social determinants of health in the care of patients with heart failure: a scientific statement from the American Heart Association. *Circulation*. 2020;141:e841–e863. doi: 10.1161/CIR.0000000000000767

19. Potter EL, Hopper I, Sen J, Salim A, Marwick TH. Impact of socioeconomic status on incident heart failure and left ventricular dysfunction: systematic review and meta-analysis. *Eur Heart J Qual Care Clin Outcomes*. 2019;5:169–179. doi: 10.1093/ehjqcco/qcy047

20. Trends in cardiometabolic risk factors in the Americas between 1980 and 2014: a pooled analysis of population-based surveys. *Lancet Glob Health*. 2020;8:e123–e133. doi: 10.1016/S2214-109X(19)30484-X

21. Brant LCC, Miranda JJ, Carrillo-Larco RM, Flood D, Irazola V, Ribeiro ALP. Epidemiology of cardiometabolic health in Latin America and strategies to address disparities. *Nat Rev Cardiol*. 2024;21:849–864. doi: 10.1038/s41569-024-01058-2

22. Hammond MM, Everitt IK, Khan SS. New strategies and therapies for the prevention of heart failure in high-risk patients. *Clin Cardiol*. 2022;45(suppl 1):S13–S25. doi: 10.1002/clc.23839

23. Lloyd-Jones DM, Hong Y, Labarthe D, Mozaffarian D, Appel LJ, Van Horn L, Greenland K, Daniels S, Nichol G, Tomaselli GF, et al; on behalf of the American Heart Association Strategic Planning Task Force and Statistics Committee. Defining and setting national goals for cardiovascular health promotion and disease reduction: the American Heart Association's strategic Impact Goal through 2020 and beyond. *Circulation*. 2010;121:586–613. doi: 10.1161/CIRCULATIONAHA.109.192703
24. Lloyd-Jones DM, Allen NB, Anderson CAM, Black T, Brewer LC, Foraker RE, Grandner MA, Lavretsky H, Perak AM, Sharma G, et al; on behalf of the American Heart Association. Life's Essential 8: updating and enhancing the American Heart Association's construct of cardiovascular health: a presidential advisory from the American Heart Association. *Circulation*. 2022;146:e18–e43. doi: 10.1161/CIR.0000000000001078
25. Petermann-Rocha F, Deo S, Celis-Morales C, Ho FK, Bahuguna P, McAllister D, Sattar N, Pell JP. An opportunity for prevention: associations between the Life's Essential 8 score and cardiovascular incidence using prospective data from UK Biobank. *Curr Probl Cardiol*. 2023;48:101540. doi: 10.1016/j.cpcardiol.2022.101540
26. Fitchett D, Zinman B, Wanner C, Lachin JM, Hantel S, Salsali A, Johansen OE, Woerle HJ, Broedl UC, Inzucchi SE; EMPA-REG OUTCOME® Trial Investigators. Heart failure outcomes with empagliflozin in patients with type 2 diabetes at high cardiovascular risk: results of the EMPA-REG OUTCOME® trial. *Eur Heart J*. 2016;37:1526–1534. doi: 10.1093/eurheartj/ehv728
27. Filippatos G, Anker SD, Agarwal R, Ruilope LM, Rossing P, Bakris GL, Tasto C, Joseph A, Kolkhof P, Lage A, et al; FIGARO-DKD Investigators. Finerenone reduces risk of incident heart failure in patients with chronic kidney disease and type 2 diabetes: analyses from the FIGARO-DKD trial. *Circulation*. 2022;145:437–447. doi: 10.1161/CIRCULATIONAHA.121.057983
28. Lincoff AM, Brown-Frandsen K, Colhoun HM, Deanfield J, Emerson SS, Esbjerg S, Hardt-Lindberg S, Hovingh GK, Kahn SE, Kushner RF, et al; SELECT Trial Investigators. Semaglutide and cardiovascular outcomes in obesity without diabetes. *N Engl J Med*. 2023;389:2221–2232. doi: 10.1056/NEJMoa2307563
29. Yusuf S, Pitt B, Davis CE, Hood WB Jr, Cohn JN; SOLVD Investigators. Effect of enalapril on mortality and the development of heart failure in asymptomatic patients with reduced left ventricular ejection fractions. *N Engl J Med*. 1992;327:685–691. doi: 10.1056/NEJM199209033271003
30. Ledwidge M, Gallagher J, Conlon C, Tallon E, O'Connell E, Dawkins I, Watson C, O'Hanlon R, Birmingham M, Patle A, et al. Natriuretic peptide-based screening and collaborative care for heart failure: the STOP-HF randomized trial. *JAMA*. 2013;310:66–74. doi: 10.1001/jama.2013.7588
31. Huelsmann M, Neuhold S, Resl M, Strunk G, Brath H, Francesconi C, Adlbrecht C, Prager R, Luger A, Pacher R, et al. PONTIAC (NT-proBNP Selected Prevention of Cardiac Events in a Population of Diabetic Patients Without a History of Cardiac Disease): a prospective randomized controlled trial. *J Am Coll Cardiol*. 2013;62:1365–1372. doi: 10.1016/j.jacc.2013.05.069
32. Khan MS, Shahid I, Anker SD, Fonarow GC, Fudim M, Hall ME, Hernandez A, Morris AA, Shafi T, Weir MR, et al. Albuminuria and heart failure: JACC state-of-the-art review. *J Am Coll Cardiol*. 2023;81:270–282. doi: 10.1016/j.jacc.2022.10.028
33. deFilippi CR, de Lemos JA, Christenson RH, Gottdiener JS, Kop WJ, Zhan M, Seliger SL. Association of serial measures of cardiac troponin T using a sensitive assay with incident heart failure and cardiovascular mortality in older adults. *JAMA*. 2010;304:2494–2502. doi: 10.1001/jama.2010.1708
34. Attia ZI, Kapa S, Lopez-Jimenez F, McKie PM, Ladewig DJ, Satam G, Pellikka PA, Enriquez-Sarano M, Noseworthy PA, Munger TM, et al. Screening for cardiac contractile dysfunction using an artificial intelligence-enabled electrocardiogram. *Nat Med*. 2019;25:70–74. doi: 10.1038/s41591-018-0240-2
35. Sangha V, Nageshi AA, Dhingra LS, Khunte A, Mortazavi BJ, Ribeiro AH, Banina E, Adeola O, Garg N, Brandt CA, et al. Detection of left ventricular systolic dysfunction from electrocardiographic images. *Circulation*. 2023;148:765–777. doi: 10.1161/CIRCULATIONAHA.122.062646
36. Dhingra L, Aminorroaya A, Pedrosa Camargos A, Sangha V, Brant L, Barreto S, Ribeiro AL, Krumholz H, Oikonomou E, Khera R. Multinational clinical and community-based validation of PRESENT-SHD, an ensemble deep learning approach for the detection of multiple structural heart disorders using electrocardiographic images. *Circulation*. 2024;150:A4146190. Abstract. doi: 10.1161/circ.150.suppl_1.4146190
37. Dhingra L, Aminorroaya A, Pedrosa A, Khunte A, Sangha V, McIntyre D, Chow C, Asselbergs F, Brant LCC, Barreto S, et al. Artificial intelligence enabled prediction of heart failure risk from single-lead electrocardiograms. *medRxiv*. Preprint posted online December 21, 2024. doi: 10.1101/2024.05.27.24307952
38. Dewan P, Jackson A, Lam CSP, Pfeffer MA, Zannad F, Pitt B, Solomon SD, McMurray JJV. Interactions between left ventricular ejection fraction, sex and effect of neurohumoral modulators in heart failure. *Eur J Heart Fail*. 2020;22:898–901. doi: 10.1002/ejhf.1776
39. Lam CSP, Voors AA, Piotr P, McMurray JJV, Solomon SD. Time to rename the middle child of heart failure: heart failure with mildly reduced ejection fraction. *Eur Heart J*. 2020;41:2353–2355. doi: 10.1093/eurheartj/ehaa158
40. Campbell RT, Petrie MC, McMurray JJV. Redefining heart failure phenotypes based on ejection fraction. *Eur J Heart Fail*. 2018;20:1634–1635. doi: 10.1002/ejhf.1325
41. Morsing AE, Gnesin F, Lyass A, Andersson C. What is a normal left ventricular ejection fraction in healthy adults? A meta-analysis of population-based echocardiographic studies. *J Cardiovasc Imaging*. 2026;34:2. doi: 10.1186/s44348-025-00063-4
42. Agarwal A, Tromp J, Almahmeed W, Angermann C, Chandramouli C, Cho H, Choi DJ, Damasceno A, Filippatos G, Fonarow GC, et al; Global Heart Failure Roundtable Group. Toward a universal definition of etiologies in heart failure: categorizing causes and advancing registry science. *Circ Heart Fail*. 2024;17:e011095. doi: 10.1161/CIRCHEARTFAILURE.123.011095
43. Banerjee A, Pasea L, Chung SC, Direk K, Asselbergs FW, Grobbee DE, Kotecha D, Anker SD, Dyszynski T, Tyl B, et al. A population-based study of 92 clinically recognized risk factors for heart failure: co-occurrence, prognosis and preventive potential. *Eur J Heart Fail*. 2022;24:466–480. doi: 10.1002/ejhf.2417
44. Richardson P, McKenna W, Bristow M, Maisch B, Mautner B, O'Connell J, Olsen E, Thiene G, Goodwin J, Gyrfas I, et al. Report of the 1995 World Health Organization/International Society and Federation of Cardiology Task Force on the Definition and Classification of cardiomyopathies. *Circulation*. 1996;93:841–842. doi: 10.1161/01.cir.93.5.841
45. Maron BJ, Towbin JA, Thiene G, Antzelevitch C, Corrado D, Arnett D, Moss AJ, Seidman CE, Young JB; on behalf of the American Heart Association. Contemporary definitions and classification of the cardiomyopathies: an American Heart Association scientific statement from the Council on Clinical Cardiology, Heart Failure and Transplantation Committee; Quality of Care and Outcomes Research and Functional Genomics and Translational Biology Interdisciplinary Working Groups; and Council on Epidemiology and Prevention. *Circulation*. 2006;113:1807–1816. doi: 10.1161/CIRCULATIONAHA.106.174287
46. Arbelo E, Protonotarios A, Gimeno JR, Arbustini E, Barriales-Villa R, Basso C, Bezzina CR, Biagini E, Blom NA, de Boer RA, et al; ESC Scientific Document Group. 2023 ESC guidelines for the management of cardiomyopathies. *Eur Heart J*. 2023;44:3503–3626. doi: 10.1093/eurheartj/ehad194
47. Arbustini E, Narula N, Dec GW, Reddy KS, Greenberg B, Kushwaha S, Marwick T, Pinney S, Bellazzi R, Favalli V, et al. The MOGE(S) classification for a phenotype-genotype nomenclature of cardiomyopathy: endorsed by the World Heart Federation. *J Am Coll Cardiol*. 2013;62:2046–2072. doi: 10.1016/j.jacc.2013.08.1644
48. Sliwa K. Heart failure can affect everyone: the ESC Geoffrey Rose lecture. *Eur Heart J*. 2020;41:1298–1306. doi: 10.1093/eurheartj/ehaa084
49. Roth GA, Huffman MD, Moran AE, Feigin V, Mensah GA, Naghavi M, Murray CJ. Global and regional patterns in cardiovascular mortality from 1990 to 2013. *Circulation*. 2015;132:1667–1678. doi: 10.1161/CIRCULATIONAHA.114.008720
50. Odone A, McKee C, McKee M. The impact of migration on cardiovascular diseases. *Int J Cardiol*. 2018;254:356–361. doi: 10.1016/j.ijcard.2017.11.084
51. Stewart S, Wilkinson D, Hansen C, Vaghela V, Mvungi R, McMurray J, Sliwa K. Predominance of heart failure in the Heart of Soweto Study cohort: emerging challenges for urban African communities. *Circulation*. 2008;118:2360–2367. doi: 10.1161/CIRCULATIONAHA.108.786244
52. Ojji D, Stewart S, Ajayi S, Manmak M, Sliwa K. A predominance of hypertensive heart failure in the Abuja Heart Study cohort of urban Nigerians: a prospective clinical registry of 1515 de novo cases. *Eur J Heart Fail*. 2013;15:835–842. doi: 10.1093/eurjhf/hft061
53. Khatibzadeh S, Farzadfar F, Oliver J, Ezzati M, Moran A. Worldwide risk factors for heart failure: a systematic review and pooled analysis. *Int J Cardiol*. 2013;168:1186–1194. doi: 10.1016/j.ijcard.2012.11.065
54. Bragazzi NL, Zhong W, Shu J, Abu Much A, Lotan D, Grupper A, Younis A, Dai H. Burden of heart failure and underlying causes in 195 countries and territories from 1990 to 2017. *Eur J Prev Cardiol*. 2021;28:1682–1690. doi: 10.1093/eurjpc/zwaa147
55. Tromp J, Ferreira JP, Janwanishstaporn S, Shah M, Greenberg B, Zannad F, Lam CSP. Heart failure around the world. *Eur J Heart Fail*. 2019;21:1187–1196. doi: 10.1002/ejhf.1585
56. Hudson JA, Sanga L, Jobe M, Etyang AO, McAllister D, Perel P, Shah AS, Ogola EN. Sub-Saharan Africa's contribution to clinical trials in international acute coronary syndromes and heart failure guidelines. *JACC Adv*. 2024;3:101383. doi: 10.1016/j.jaccadv.2024.101383

57. Hulot J-S, Ter Maaten JM, Bayes-Genis A, Halliday BP, Metra M, Moura B, Petrie MC, Savarese G, Senni M, Van Linthout S, et al. Heart failure improvement, remission, and recovery: a *European Journal of Heart Failure* expert consensus document. *Eur J Heart Fail*. doi: 10.1002/ejhf.3732
58. Greene SJ, Bauersachs J, Brugts JJ, Ezekowitz JA, Lam CSP, Lund LH, Ponikowski P, Voors AA, Zannad F, Zieroth S, et al. Worsening heart failure: nomenclature, epidemiology, and future directions: JACC review topic of the week. *J Am Coll Cardiol*. 2023;81:413–424. doi: 10.1016/j.jacc.2022.11.023
59. Metra M, Tomasani D, Adamo M, Bayes-Genis A, Filippatos G, Abdelhamid M, Adamopoulos S, Anker SD, Antohi L, Böhm M, et al. Worsening of chronic heart failure: definition, epidemiology, management and prevention: a clinical consensus statement by the Heart Failure Association of the European Society of Cardiology. *Eur J Heart Fail*. 2023;25:776–791. doi: 10.1002/ejhf.2874
60. Pocock SJ, Ferreira JP, Packer M, Zannad F, Filippatos G, Kondo T, McMurray JJV, Solomon SD, Januzzi JL, Iwata T, et al. Biomarker-driven prognostic models in chronic heart failure with preserved ejection fraction: the EMPEROR-Preserved trial. *Eur J Heart Fail*. 2022;24:1869–1878. doi: 10.1002/ejhf.2607
61. McDowell K, Campbell R, Simpson J, Cunningham JW, Desai AS, Jhund PS, Lefkowitz MP, Rouleau JL, Swedberg K, Zile MR, et al. Incremental prognostic value of biomarkers in PARADIGM-HF. *Eur J Heart Fail*. 2023;25:1406–1414. doi: 10.1002/ejhf.2887
62. Lindenfeld J, Costanzo MR, Zile MR, Ducharme A, Troughton R, Maisel A, Mehra MR, Paul S, Sears SF, Smart F, et al; GUIDE-HF, CHAMPION, and LAPTOP-HF Investigators. Implantable hemodynamic monitors improve survival in patients with heart failure and reduced ejection fraction. *J Am Coll Cardiol*. 2024;83:682–694. doi: 10.1016/j.jacc.2023.11.030
63. Bozkurt B. Differentiation between worsening heart failure and decompensated heart failure. *JACC Heart Fail*. 2023;11:859–861. doi: 10.1016/j.jchf.2023.06.001
64. Bozkurt B. Proposed new conceptualization for definition of decompensated HF: taking the acute out of decompensation. *JACC Heart Fail*. 2023;11:368–371. doi: 10.1016/j.jchf.2023.02.001
65. Køber L, Torp-Pedersen C, Carlsen JE, Bagger H, Eliassen P, Lyngborg K, Videbaek J, Cole DS, Auclert L, Pauly NC. A clinical trial of the angiotensin-converting-enzyme inhibitor trandolapril in patients with left ventricular dysfunction after myocardial infarction: Trandolapril Cardiac Evaluation (TRACE) Study Group. *N Engl J Med*. 1995;333:1670–1676. doi: 10.1056/NEJM199512213332503
66. Vantrimpont P, Rouleau JL, Wun CC, Ciampi A, Klein M, Sussex B, Arnold JM, Moyé L, Pfeffer M. Additive beneficial effects of beta-blockers to angiotensin-converting enzyme inhibitors in the Survival and Ventricular Enlargement (SAVE) Study: SAVE Investigators. *J Am Coll Cardiol*. 1997;29:229–236. doi: 10.1016/s0735-1097(96)00489-5
67. Baman TS, Lange DC, Ilg KJ, Gupta SK, Liu TY, Alguire C, Armstrong W, Good E, Chugh A, Jongnarangsin K, et al. Relationship between burden of premature ventricular complexes and left ventricular function. *Heart Rhythm*. 2010;7:865–869. doi: 10.1016/j.hrthm.2010.03.036
68. Penela D, Van Huls Van Taxis C, Van Huls Vans Taxis C, Aguinaga L, Fernández-Armenta J, Mont L, Castel MA, Heras M, Tolosana JM, Sitges M, et al. Neurohormonal, structural, and functional recovery pattern after premature ventricular complex ablation is independent of structural heart disease status in patients with depressed left ventricular ejection fraction: a prospective multicenter study. *J Am Coll Cardiol*. 2013;62:1195–1202. doi: 10.1016/j.jacc.2013.06.012
69. Penela D, Acosta J, Aguinaga L, Tercedor L, Ordoñez A, Fernández-Armenta J, Andreu D, Sánchez-Millán FJ, Cabanelas N, Tolosana JM, et al. Ablation of frequent PVC in patients meeting criteria for primary prevention ICD implant: safety of withholding the implant. *Heart Rhythm*. 2015;12:2434–2442. doi: 10.1016/j.hrthm.2015.09.011
70. Friday JM, Cleland JGF, Pellicori P, Wolters MK, McMurray JJV, Jhund PS, Forsyth P, McAllister DA, Graham FJ, Jones Y, et al. Loop diuretic therapy with or without heart failure: impact on prognosis. *Eur Heart J*. 2024;45:3837–3849. doi: 10.1093/eurheartj/ehae345
71. Vrints C, Andreotti F, Koskinas KC, Rossello X, Adamo M, Ainslie J, Banning AP, Budaj A, Buechel RR, Chiariello GA, et al; ESC Scientific Document Group. 2024 ESC guidelines for the management of chronic coronary syndromes. *Eur Heart J*. 2024;45:3415–3537. doi: 10.1093/eurheartj/ehae177

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