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Racial and ethnic disparities in arrhythmia care: A call for action

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Introduction

Racial, cultural, and socioeconomic factors drive the disparities in the diagnosis, management, outcomes, and study of diseases. Among racial and ethnic minority populations, those of Asian, Native American, and Hispanic origin are grossly underrepresented in clinical studies. Most of the clinical research and data regarding the various aspects of a disease are limited to racial groups of Western European origin. In the multiethnic and multiracial US, African American or Black individuals are the next most studied racial and ethnic minority group. The overall cost of racial and ethnic disparities resulting in health care inequalities and premature death is estimated to be around \$1.24 trillion.¹

Despite advances in the field of cardiac electrophysiology, significant racial and ethnic disparities exist. Compared with White individuals, Black individuals with cardiovascular disease generally have a higher burden of comorbidities and have an increased risk of adverse arrhythmia-related outcomes.²⁻⁴ Understanding varied risk factor profiles and ways to improve clinical outcomes is critical to mitigating health care disparities and their resultant socioeconomic burden. The copious number of publications documenting the pervasiveness of these disparities warrants immediate attention and a call to action. Medical societies, professionals, researchers, governmental agencies, communities that include predominantly racial and ethnic minorities, and faith leaders should be galvanized and coordinate efforts with clinicians to affect a salutary outcome. Despite having the most advanced and sophisticated health care system, clinical outcomes of various diseases, including all aspects of cardiovascular disease, differ across racial and ethnic groups in the US. The present paper highlights the racial and ethnic differences in arrhythmia management and outcomes between White and Black populations and outlines recommendations that will assist the Heart Rhythm Society in achieving its goal of equitable care in the management of heart rhythm disturbances in North America (Figure 1).

Racial and ethnic differences in cardiac arrhythmias

Atrial fibrillation

Epidemiologic data relevant to atrial fibrillation (AF) are by far more extensive than those for any other cardiac arrhythmias, likely due to the global burden of AF. However, data on AF among various racial and ethnic populations including American Indian or Alaska Native, Native Hawaiian, or other Pacific Islander populations are limited. Often, differences in study design, access to care, and AF detection methods preclude direct comparisons across various racial and ethnic groups.

Black individuals are known to have a lower incidence and prevalence of AF than White individuals in several population studies, including the Multi-Ethnic Study of Atherosclerosis (MESA)⁵ and the Veterans Affairs studies.⁶ In addition, Kamel et al⁷ analyzed 101,773 patients with de novo pacemaker implantation (with no prior history of AF) and demonstrated that Black individuals had a significantly lower risk of AF than White individuals during the follow-up period (3.7 ± 1.8 years) (Figure 2).

Regardless of low AF prevalence, traditional AF risk factors (ie, diabetes, hypertension, heart failure, obesity, pericardial fat pad, and smoking) are more frequently found in Black individuals.⁸ The increased prevalence of established risk factors but lower rates of AF is often termed the “atrial fibrillation racial paradox” (Figure 3). Although the precise reason for this paradox remains poorly understood, several potential explanations likely contribute: (1) ascertainment bias (related to diminished access to health care),^{9,10} (2) survival bias (a longer life expectancy in the White population may confer an increased risk of AF), and (3) the paroxysmal nature of AF (and reduced sensitivity of electrocardiogram screening) may result in underdetection of AF. The MESA study reported that in 14 years of follow-up, AF was clinically diagnosed more often in White individuals (11.3%) than in those who were African American (6.6%); conversely, Hispanic (7.8%) and Chinese (9.9%) individuals had an AF prevalence similar to that for White individuals.¹⁰ When the researchers systematically screened with a 144-day continuous electrocardiogram monitor, the proportion of monitor-detected AF did not differ significantly by race or ethnicity. Undoubtedly, lower access to care and limited inclusion in large clinical trials account for a portion of the underdetection of AF among the Black population but are unlikely to fully explain the paradox.

In addition to traditional AF risk factors, novel risk factors (ie, obstructive sleep apnea, excessive alcohol intake, low birth weight, P wave indices, decreased physical activity, and subclinical coronary artery disease) and the presence of AF biomarkers (brain natriuretic peptide or C-reactive protein) have been implicated as contributory to AF.¹¹ However, the interplay of these risk factors with genetic and environmental factors remains unknown. Black individuals with a higher percentage of European ancestry have been shown to have a greater risk of AF.¹² In a study of 9 candidate single nucleotide polymorphisms (SNPs) from the Atherosclerosis Risk in Communities Study (ARIC) and Cardiovascular Health Study (CHS), only one SNP on chromosome 10q22 (associated with higher AF risk in White individuals) was found to be significantly protective against AF in Black individuals (accounting for approximately 11–32% reduction in AF).¹³ However, admixture mapping, including the addition of the Health, Aging, and Body Composition (Health ABC) study, failed to demonstrate that any genetic variants reached genome-wide significance. The ability to include only 4,938 Black participants in these analyses likely limited the power to detect statistically significant genetic findings in this study. Nevertheless, currently only 10% of AF heritability can be explained by common and rare genetic variants—thus suggesting supplementary polygenic and nongenetic influences, including potential epigenetic and environmental factors, are likely involved in the AF racial paradox. In contradistinction, race has been proposed in one AF risk model (CHARGE-AF, taking into account age [per 5-year increment], race, height [per 10-cm increment], weight [per 15-kg increment], systolic blood pressure [per 20-mm Hg increment], diastolic blood pressure [per

10–mm Hg increment], smoking [current vs former/never], antihypertensive medication use, diabetes, heart failure, and myocardial infarction) that demonstrated improved prediction for incident AF as compared with the well-known CHA₂DS₂VASc score in Black individuals.¹⁴ Among individuals with AF, Black individuals are at a twofold increased risk of adverse clinical outcomes (ie, stroke, heart failure, and all-cause mortality) compared with White individuals.^{15–17} The intersection of comorbidities with lower access to care and lower rates of oral anticoagulation use and rhythm control interventions coupled with suboptimal control of hypertension and diabetes may explain the worse outcomes in Black individuals with AF.¹⁸

Supraventricular arrhythmias

Racial and ethnic differences in supraventricular arrhythmias other than AF have been less well studied, with limited data suggesting a slightly increased prevalence of supraventricular tachycardias in White individuals compared with Black individuals.¹⁹ Due to the lack of data on supraventricular arrhythmias and the impact of ethnicity and race on outcomes, racial and ethnic differences in access to care, treatment modality, and outcomes need to be further investigated.

Sudden cardiac death

The data on the racial and ethnic diversity of ventricular arrhythmias are limited and often extrapolated from publications on sudden cardiac death (SCD) or cardiac arrest. Black individuals have the highest incidence of SCD across all age groups compared with White individuals, even after adjustment for cardiovascular risk factors.^{20,21}

In fact, the coronavirus disease 2019 pandemic brought to attention structural racism and its impact on out-of-hospital sudden death in a study from New York City. These data are compounded by the fact that Black individuals are more likely to present with a nonshockable rhythm and have a lower probability of survival post–cardiac arrest than White individuals, which could be related to differences in the application of bystander cardiopulmonary resuscitation and/or emergency service response time.^{22–25} Although the precise reasons remain unknown, an interplay of different socioeconomic, medical, and genetic risk factors may contribute to this racial disparity. Studies have shown that Black individuals have an increased prevalence of hypertensive heart disease, which portends an increased risk of SCD despite adjustment for other risk factors.^{22,26,27} The incidence of SCD is higher in areas with poor socioeconomic status with poor long-term outcomes following cardiac arrest.²⁸ Limited access to appropriate health care, lack of trust in the health care system, or race-based heterogeneity in treatment choices offered by physicians driven by unconscious or conscious bias could be potential reasons for poor long-term outcomes. In a study comparing a Finnish cohort to a North American cohort, poor socioeconomic status played a significant role in long-term survival/success regardless of differences in the health care system.²⁹ Additionally, Black individuals were less likely to receive secondary prevention implantable cardioverter-defibrillator (ICD) therapy, mirroring the underutilization of primary prevention ICD implantation.^{30–32} In addition to the mentioned modifiable risk factors, several nonmodifiable risk factors may contribute to adverse cardiovascular outcomes. The prevalence of certain sodium and potassium channel

mutations related to inherited arrhythmias are higher in Black populations than in White populations. A SNP in the Y1102 allele of the *SCN5A* gene (present in Black individuals and not in White individuals) has been associated with an increased risk of ventricular arrhythmias^{33,34} and appropriate ICD therapies.³⁵ Variations in ion channel variants p.Asp85Asn-KCNE1 and p.Ser1103Tyr-SCN5A have been associated with increased risk of ventricular arrhythmias and SCD in Black individuals compared with White individuals (Figure 4).^{34,36}

Marked differences exist in the incidence of various serious arrhythmias and clinical outcomes between Black and White individuals. However, aggressive treatment strategies might bridge the gap for racial and ethnic minorities. Accessible comprehensive health screening, improved diagnosis, patient-centered health literacy, and shared decision-making may mitigate health disparities and improve overall health for all.

Inherited arrhythmias and cardiomyopathies

Limited data exist on racial and ethnic differences in electrocardiographic conduction abnormalities and their impact on long-term outcomes. Nonetheless, racial and ethnic differences in depolarization and repolarization abnormalities are notable.

Black individuals with heart failure with reduced ejection fraction and progressive QRS prolongation have increased heart failure hospitalizations, readmission rates, and mortality.^{37,38} Similarly, the QT interval has been identified as a risk factor for SCD in Black individuals. Both the ARIC study³⁹ and Duke Databank for Cardiovascular Disease⁴⁰ demonstrated that prolonged QT interval predicted increased risk of silent myocardial infarction and coronary artery disease and was associated with adverse cardiovascular events in both races, but with higher predilection in Black individuals.

Early repolarization abnormality refers to the electrocardiographic phenotype affecting the junction between the QRS complex and the ST segment in the inferolateral leads (often referred to as J-wave syndromes). Although several studies have demonstrated that Black individuals have an increased prevalence of J-wave syndrome, there were no differences in the risk of SCD compared with White individuals.⁴¹⁻⁴³

Black individuals with hypertrophic cardiomyopathy have an increased incidence of SCD compared with White individuals; however, this diagnosis is often complicated by a higher prevalence of hypertension in the former. Black individuals with hypertrophic cardiomyopathy are more likely to have concentric and apical hypertrophy and deeper T-wave inversion in lateral leads than White individuals (among whom asymmetric hypertrophy predominates) (Table 1).⁴⁴ In addition, Black individuals are less likely to undergo risk stratification for SCD, electrophysiological testing to assess for sustained and hemodynamically significant ventricular arrhythmias, surgical myomectomy, and ICD therapy than White individuals.⁴⁴⁻⁴⁶

Racial and ethnic disparities in therapeutic electrophysiological interventions

Pharmacotherapy for cardiac arrhythmias

Racial differences exist in pharmacologic and procedural rhythm control in Black individuals compared with White individuals. Black individuals are more likely to undergo a rate control strategy (and less likely a rhythm control approach) for AF than White individuals.⁴⁷ In the subgroup analysis of the Atrial Fibrillation Follow-Up Investigation of Rhythm Management (AFFIRM) study, Black individuals, in addition to being underrepresented, had a similar overall survival between rate and rhythm control arms, but when compared with White individuals, they had reduced AF-free survival during the 5-year follow-up period.⁴⁸ Of patients with concomitant heart failure and AF, Black and Hispanic individuals had a disproportionately higher risk of inpatient death.⁴⁷

Significant racial differences exist in the use of oral anticoagulation for stroke risk reduction in patients with AF. Black individuals with AF have a twofold increased risk of ischemic stroke compared with White individuals.⁴⁹ In the Reasons for Geographic and Racial Differences in Stroke (REGARDS) substudy, Black individuals were 25% less likely to be initiated on warfarin than White individuals.⁵⁰ Studies have also demonstrated a reduced likelihood to fill a prescription for warfarin upon hospital discharge in Black individuals.^{2,51} Furthermore, those who remained on warfarin had a lower time in the therapeutic range compared with White individuals even after adjustment for confounders.⁵² Possible explanations include poor socioeconomic status, lack of access to health care, inadequate follow-up by health care providers, and financial limitations. In addition, Black individuals are less likely to be referred for specialty evaluation with a cardiac electrophysiologist.⁵³

In view of the above findings and in line with AF management guidelines, treatment with direct oral anticoagulants (DOACs) is preferred over warfarin in DOAC-eligible Black individuals.⁵⁴ DOACs have fewer drug–drug interactions, have no dietary restrictions, and significantly decrease the risk of intracranial hemorrhage compared with warfarin.⁵⁵ Black individuals have had poor representation in the landmark clinical trials of DOACs—constituting only 1% of the overall study population (Table 1). Similar to the warfarin data, data from several studies (Get With The Guidelines,⁵⁶ Medicare data,⁵⁷ and Outcomes Registry for Better Informed Treatment of Atrial Fibrillation [ORBIT-AF] trial⁵⁸) have shown that Black individuals were less likely to receive a DOAC prescription than White individuals. The data from the Veterans Affairs study also suggest that Black individuals are less likely to be switched from warfarin to DOAC (regardless of international normalized ratio)⁵⁹ despite the setting where equal access to care is expected for veterans of all races. On a similar note, there is concerning evidence of a reduced rate of oral anticoagulant use and rhythm control strategies among patients with other racial and ethnic minorities.⁶⁰

In a recently published Catheter Ablation vs Antiarrhythmic Drug Therapy for Atrial Fibrillation (CABANA) trial substudy comparing ablation and drug therapy for AF in racial and ethnic minorities, only 9.9% of participants (127 of 1280) constituted racial and ethnic minorities. Although various racial and ethnic minority groups were combined as a

whole, racial and ethnic minorities randomized to antiarrhythmic drug therapy had a higher event rate (composite of death, disabling stroke, serious bleeding, or cardiac arrest) than non-racial and ethnic minority participants (27.4% vs 9.4%).⁶¹ Similarly, in a subanalysis of the Multicenter UnSustained Tachycardia Trial (MUSTT), Black individuals who underwent electrophysiology study-guided treatment for sustained ventricular tachycardia had a poorer long-term prognosis—primarily attributed to initial antiarrhythmic drug response and less ICD implantation—than White individuals (Figure 2).⁴⁶

Catheter ablation for cardiac arrhythmias

There are notable racial differences in the use of catheter ablation for the treatment of cardiac arrhythmias. In a study from Johns Hopkins University, of 792 patients who underwent catheter ablation for AF, 93% of patients were White individuals while only 2% were Black individuals.⁶² Similarly, there was a significant underutilization of cardioversion, catheter ablation, and surgical maze procedure among racial and ethnic minority groups with heart failure and AF compared with White individuals.^{47,52,63} Similarly, Black individuals and other racial and ethnic minorities are significantly underrepresented across the continuum of ventricular arrhythmia catheter ablation trials and are more likely to have nonischemic cardiomyopathy, which may impact ablation outcomes.⁶⁴ In a study from the US Medicare database, of all the patients who underwent ventricular tachycardia ablation between 2000 and 2012, 90% were White individuals and 7% were Black individuals.⁶⁵ As mentioned previously, in a prespecified subgroup analysis of the CABANA trial, catheter ablation was associated with a significant reduction in the primary endpoint of death, disabling stroke, serious bleeding or cardiac arrest, and all-cause mortality compared with antiarrhythmic drug therapy, highlighting the importance of racial and ethnic diversity in trials of catheter ablation for cardiac arrhythmias (Figure 2).

Left atrial appendage occlusion

Percutaneous left atrial appendage occlusion (LAAO) with the Watchman device (Boston Scientific, Marlborough, Massachusetts) is a viable alternative to long-term anticoagulant therapy in patients with AF and enhanced risk of bleeding. The Food and Drug Administration (FDA) approved the Watchman device in the US for the prevention of systemic embolic events in qualified patients. The pivotal trials PROTECT AF (Watchman Left Atrial Appendage System for Embolic Protection in Patients With Atrial Fibrillation)⁶⁶ and PREVAIL (Prospective Randomized Evaluation of the Watchman LAA Closure Device in Patients With Atrial Fibrillation Versus Long Term Warfarin Therapy)⁶⁷ both demonstrated a significant underrepresentation of Black individuals and other racial and ethnic minorities, exhibiting the need for robust efforts to include Black individuals and other minority groups in these seminal trials. Similarly, in a real-world registry analysis, Black individuals constituted ~3% of all patients who underwent LAAO and White individuals constituted 92.3%.⁶⁸ The incidence of device-related thrombosis following percutaneous LAAO in Black individuals was 7.7% (as compared with 3.9% in White individuals), even though Black individuals constituted only 0.7% of the overall cohort of PROTECT AF, PREVAIL, CAP (Continued Access to PROTECT AF registry), and CAP2 (Continued Access to PREVAIL registry) (Figure 2).⁶⁹ In a recently published national cohort from the US undergoing LAAO (a reflection of real-world data, outside of clinical

trials), there was an increased burden of procedure-related outcomes in minority ethnic groups compared with White individuals.⁷⁰ This disparity in outcomes warrants further investigation.

Cardiac implantable electronic devices

Despite rapidly advancing device technology, Black individuals are less likely to undergo cardiac implantable electronic device (CIED) implantation than White individuals.⁷¹ For reasons unknown, Black individuals are also less likely to undergo both primary and secondary prevention therapies with ICD implantation.^{32,72} This includes the underutilization of cardiac resynchronization therapy (CRT) in the US. In a study by Sridhar et al,⁷³ 80% of patients who underwent CRT implantation were White individuals and only 10% were Black individuals during the period 2003–2010. These data are striking given that Black individuals have been shown to derive benefits from CRT similar to those observed for White individuals, when a fair representation of the former was under study.⁷⁴ Similarly, in a study from the National Cardiovascular Data Registry (NCDR), Black individuals who were eligible for CRT with defibrillator were less likely to receive therapy than White individuals. In contrast, White individuals were more likely to receive CRT with defibrillator outside of published guidelines.⁷⁵ Mirroring the CIED trends in Black individuals, lead extraction follows a similar trajectory of lower utilization, regardless of underlying pathology (Figure 2).⁷⁶

Black individuals are less likely to receive guideline-indicated medical therapies, including pharmacotherapy (anticoagulation or antiarrhythmic drugs), catheter ablation, and CIEDs. Effective implementation of evidence-based guidelines, understanding cultural preferences, overcoming fragmented follow-up, and use of population-based strategies are essential to improving cardiovascular health in Black individuals.

Racial and ethnic disparities in research

Research aimed at elucidating the etiology of racial inequities in arrhythmia care has been limited but suggests that causes are likely multifactorial in nature, including patient mistrust of research, poor clinician–patient communication, implicit bias, disproportionate prevalence of limited health literacy, decreased access to health care, and health system–related factors. The factors that contribute to racial inequities may vary for different racial and ethnic groups.⁷⁷

Drivers of racial and ethnic differences in arrhythmia care

Social determinants of health

Social determinants of health (SDOH) represent the influence of circumstances in which individuals are born, live, work, and age. Black individuals constitute the oldest nonnative population in the US, yet their markers of socioeconomic position (education, valued work, social connections, food, and financial security) remain below those of many other racial groups. More than 30% of Black individuals in the US are living below the poverty line. The mean life expectancy is 3.4 years less with lower median household income (\$43,151 vs \$66,632) in Black Americans compared with White Americans. In addition

to more prevalent limited health literacy, other stressors, including unemployment, labile social support systems, residential environment, geographic isolation, and inherent systemic racism, play a major role in the “health ethnic divide.”⁷⁸ Studies have shown that the structure of neighborhoods and their racial composition significantly impact health care outcomes, with the worst clinical consequences noted when Black individuals reside in African American–dominated localities.⁷⁹ The racial segregation of communities primarily driven by cultural, economic, and political divisions creates an inequity in access to governmental resources, driving the chasms in education, health, and employment. The role that an intact family structure plays and the involvement of faith-based leaders may result in improvement in the noted inequities and perception of the health care system delivering care to communities in need.⁸⁰

Thus, population-based efforts should be made through policy changes, private–public partnerships, and a concerted commitment to allocate resources to address the downstream impact of SDOH on health outcomes among at-risk racial and ethnic populations. Risk models that have been universally designed and largely validated in homogeneous racial and ethnic populations should be updated continuously and adjusted to account for racial differences in SDOH. Moreover, biomedical researchers should work toward testing these models in racially and ethnically diverse populations in heterogeneous geographical locations to mitigate the ever-growing health care gap.

Cultural humility

Studies have shown that if patients perceive that their clinicians are like them and understand their cultural and social beliefs, they are more likely to be compliant with clinician visits and adhere to medical advice.^{81–83} Investigation is also underway to evaluate the role of racial concordance in medical decision-making in relation to ICD utilization.⁸⁴ Equity, diversity, inclusion, and antiracism training should be an integral part of medical education. Lower socioeconomic position is often associated with poor patient education and engagement and influences clinician behavior and choice of diagnostic testing and treatments.⁸⁵ The effect of race and socioeconomic status on clinicians’ perception of patients may lead to differences in health care, availability of affordable therapies, and treatment interventions for Black and White individuals. Therefore, graduate medical education should include cultural humility training of clinicians (beyond basic medical training) to facilitate understanding the nuances of cultural differences in order to provide personalized medical care and to counteract the stereotypical beliefs and implicit bias that have been shown to affect medical decisionmaking and patient care. Conducting community-based research and promoting interventions with community participation may also provide an opportunity to narrow this health ethnic divide.⁸⁶

Representation of racial and ethnic minorities in clinical trials and arrhythmia research

Most clinical trials of cardiovascular disease and arrhythmia research predominantly enroll White individuals and have low enrollments of individuals from Hispanic/Latinx, Black/African American, American Indian/Alaska Native, Hawaiian/Pacific Islander, and some

Asian populations. Because safety and effectiveness may vary in different populations, the lack of racial and ethnic diversity in clinical trial enrollment compromises the health care that can be delivered to those who are excluded. Often the results of these studies are extrapolated to the general population, but it is unclear how generalizable these results are to racial and ethnic minorities. Due to the poor enrollment of racial and ethnic minorities and women in clinical trials, the National Institutes of Health (NIH) Revitalization Act of 1993 was signed into law and directed the NIH to establish guidelines for inclusion of women and racial and ethnic minorities in clinical research.^{87,88} Despite this mandate, there remain significant inequities in the racial and ethnic diversity of NIH-funded cardiovascular studies.⁸⁹ The factors contributing to the lack of racial and ethnic diversity in clinical trials are multifactorial and complex and include current and historical research atrocities against racial and ethnic minorities, lack of community and patient engagement, and system barriers, including arduous consenting processes and inflexible research protocols that do not consider real-life experiences and priorities of many potential research participants. Centuries of discrimination, segregation, forced unconsented medical research, and denial of access to care have likely fostered significant distrust in the medical system and discouraged Black individuals from enrolling in clinical studies.⁹⁰ A research letter in *JACC* determined the racial and ethnic minority participation in major AF clinical trials by examining trials cited in the 2019 American Heart Association (AHA)/American College of Cardiology (ACC)/Heart Rhythm Society (HRS) focused update of the 2014 AHA/ACC/HRS guideline for atrial fibrillation. Less than half of the 34 trials included reported participant-level race and/or ethnicity data, and only 8 reported Black and 6 reported Hispanic participants.⁹¹ Intentionally enrolling racial and ethnic minorities in clinical studies will undoubtedly advance our understanding of disease substrate and potentially identify modifiers in these racial and ethnic minority patient populations. It is well documented that the primary reason most patients participate in clinical trials is that they were invited or asked to participate. There exists a longstanding narrative that racial and ethnic minority patients are not interested in participating in biomedical research, yet studies over the past decade have documented a willingness to participate among racial and ethnic minority patients when invited to participate. Current research also highlights the importance of training research teams on the impact of implicit bias on patient engagement as a major barrier affecting the overall accrual and diversity in clinical trials and research. Finally, previous studies such as the Beta-Blocker Evaluation of Survival Trial (BEST), Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT), and the African American Heart Failure Trial (A-HeFT) that have had success in enrolling racial and ethnic minorities may provide the best practices for implementation.⁹²

Priority areas for intervention

Implicit bias

The purpose of clinical practice guidelines informed by clinical trials and registries is to understand various disease substrates and study the effects of new treatment interventions and outcomes in an attempt to offer the best possible treatment regardless of sex, race, or ethnicity. Studies have shown that non-Hispanic White clinicians may perceive Black individuals as nonadherent—a perception often influenced by their socioeconomic position

and reflecting implicit bias, which is a term used to describe attitudes and preferences toward people without conscious knowledge.⁹³⁻⁹⁵ In fact, educating clinicians about implicit bias may change their attitude as well as reduce bias and subsequent impact on decision-making.^{94,96} In 2015, Hall et al⁹³ conducted a systematic review to examine the influence of racial and ethnic bias among clinicians on health care outcomes. Almost all studies included in the review were cross-sectional, relied on convenience sampling, involved US participants, and used the implicit association test to assess implicit bias among the clinicians. Although some associations between implicit bias and health care outcomes were nonsignificant, results also showed that implicit bias was significantly related to patient-provider interactions, treatment decisions, treatment adherence, and patient health outcomes. Implicit attitudes were more often significantly related to patient-provider interactions and health outcomes than to treatment processes. Most clinicians appear to have an implicit bias in terms of positive attitudes toward White individuals and negative attitudes toward people of color.⁹³

Drawing upon evidence in social cognitive psychology, Burgess et al⁹⁷ have outlined strategies and skills for clinicians to prevent implicit racial biases from influencing the clinical encounter. Their framework includes (1) enhancing internal motivation and avoiding external pressure to reduce bias, (2) enhancing understanding of the psychosocial basis of bias, (3) enhancing providers' confidence in their ability to successfully interact with socially dissimilar patients, (4) enhancing emotional regulation skills specific to promoting positive emotions, (5) increasing perspective-taking and affective empathy, and (6) improving the ability to build partnerships with patients.⁹⁷ This framework could potentially be incorporated into a required recurring training for all health care personnel to address the contribution of implicit bias to racial and ethnic disparities in care.

Structural racism

Until medical leaders, professional medical societies, policy makers, scientists, and others responsible for defining and responding to the public discourse around health inequities consistently acknowledge the contribution of structural racism and discrimination, efforts to "close the gap" will remain an unmet need. Any discussion should begin with a definition of racism that encompasses a contemporary meaning rooted in historical context. Racism has multiple forms, including individual racism (personal belief), institutional racism (legalized and normalized structure of disadvantaging racial groups within an institution), and structural racism (the normalization and legitimization of an array of dynamics that are historical, cultural, institutional, and interpersonal that routinely disadvantage racial and ethnic minorities).⁹⁸

The data supporting the existence of segregated hospitals, the clustering of care among a small proportion of primary care physicians, and the challenges that these facilities and clinicians experience in accessing subspecialty care and delivering high-quality care for racial and ethnic minorities are well documented.⁹⁹⁻¹⁰¹

Although small in comparison with psychosocial approaches, an emerging body of research has begun to investigate the relationship between health and four domains of state-level structural racism: political participation, employment and job status, educational attainment,

and judicial treatment, including incarceration.¹⁰² Black individuals living in states with higher levels of structural racism in these domains were more likely than those living in states with lower levels of structural racism to self-report a myocardial infarction in the previous year; meanwhile, the same association for White individuals was null or protective.¹⁰³ The emphasis for this type of research in electrophysiology is needed to promulgate meaningful contributions to addressing racial and ethnic health inequalities.

The need to diversify the biomedical workforce

Black individuals constitute 13% of the US population, yet only 4% are physicians and 2.7% are cardiologists.¹⁰⁴ A report from the National Heart, Lung, and Blood Institute (NHLBI) recommends transdisciplinary cultural training programs to diversify health care workers and researchers.¹⁰⁵ Increased representation by Black, Indigenous, and other people of color within the health care workforce allows for improved understanding of challenges that exist for myriads of patients and contributes to more inclusive policies, interventions, and programs. The US Department of Health and Human Services Office of Minority Health notes the following benefits of a racially and ethnically diverse workforce: improved access to high-quality care for underserved populations, greater patient choice and satisfaction mediated through racial concordance, improved patient–clinician relationships with increased trust and communication, increased likelihood of patients accepting and receiving evidence-based medical care, and the potential for improved health.

Advocacy

There is a clear need not only to improve the engagement of racial and ethnic minority patients in health care research but also to encourage and empower physician-scientists from these racial and ethnic groups. Unlike Black individuals, other racial and ethnic minorities in the US have a proportionally higher number of clinicians and researchers while having a significantly lower representation of subjects in clinical research.¹⁰⁶ This “ethnic paradox” needs to be further addressed so that an appropriate understanding of the nature of health care disparities can be better understood. How an individual feels about his or her race or ethnicity is directly proportional to sense of well-being, academic excellence, and reduced distress and unhealthy behaviors, all of which are essential for health, well-being, and economic development.¹⁰⁷ The race and ethnicity of both clinicians and patients affect their ability to develop a shared doctor–patient relationship in numerous ways, with the most obvious being the occasion when a language barrier exists. Health care professionals from well-represented racial and ethnic groups should seek longitudinal learning experiences that incorporate techniques to minimize bias, examine structural and interpersonal domains of racism, and explore the dimensions of cultural humility as strategies for reducing inequities in the delivery of high-quality care for racial and ethnic minorities. Until leadership positions are more diverse and pathways to leadership are better defined for racial and ethnic minorities, current leaders must intentionally sponsor, mentor, and advise historically underrepresented racial and ethnic group members and actively seek to offer roles in scientific conferences, industry collaborations, and editorial boards to the many qualified individuals from these groups (Figure 5).

Intersocietal collaboration

The Heart Rhythm Society (HRS) is a 501c3 international nonprofit organization founded in 1979 with a mission to improve the care of all patients by promoting research, education, and optimal health care policies and standards. The Heart Rhythm Society is a leading resource on cardiac pacing and electrophysiology. Its worldwide reach and representation in more than 90 countries should afford its credibility and influence in the pursuit of diversity, equity, and inclusion in all organizational endeavors and initiatives. The American Heart Association (AHA) and the American College of Cardiology (ACC) are collaborative organizations that also have coexisting programmatic activities and strong leadership commitment, via their boards of trustees and executives, to promote our similar missions to address diversity, equity, and inclusion in the workforce, educational sphere, research, racial and ethnic communities, and within their organizational structure. The American College of Cardiology has been a pioneer in this regard and is only second to the Association of Black Cardiologists (ABC), which has been at the forefront of addressing racial and ethnic disparities in cardiovascular disease since 1974. From its inception, the Association of Black Cardiologists has been committed to its stated mission to decrease the burden of cardiovascular disease in racial and ethnic minority populations through education, research, and advocacy. The Association of Black Cardiologists thus has been unwavering in this mission with a focus on Black individuals and the underserved who are burdened by cardiovascular disease. All of these organizations have collaborated with the Heart Rhythm Society, other societies, and industry partners in this effort via educational programs both in the community and among cardiovascular professionals, joint symposia, annual scientific sessions, and advocacy, didactic, and leadership programs for trainees, allied health professionals, and other clinicians.

Most germane to the effort to resolve disparities in cardiovascular disease management is the inclusion of medical professionals from various racial and ethnic groups who will be the purveyors of the mission and disseminators of knowledge within their respective communities where they can be most impactful. Hence, the Alliance of Multicultural Physicians, referred to as simply the Alliance, was formed. The Alliance is a collective of five national organizations: Association of American Indian Physicians (AAIP), Association of Black Cardiologists (ABC), National Council of Asian Pacific Islander Physicians (NCAPIP), National Hispanic Medical Association (NHMA), and National Medical Association (NMA). These organizations represent over 100,000 physicians serving millions of people in multicultural communities across the US and its territories. The mission of the Alliance is to collaborate with other societies in developing educational, outreach, and training initiatives for students, physicians, and the patients they serve to advance health equity. They also desire to build a diverse workforce and exchange scientific information through various platforms suitable to the location of communities their members serve. The Alliance members are stalwart believers that their objectives will be attained through the development and delivery of culturally and linguistically appropriate educational materials and information about pharmacologic and nonpharmacologic therapies for medical providers served by the Alliance as well as the populations they serve, and through a wide variety of platforms including but not limited to community organizations, places of worship, and

meetings and conferences. These activities are aimed at trying to reduce the burden of diseases and conditions that adversely affect Alaska Native, American Indian, Asian, Black American, Hispanic, Native Hawaiian, Pacific Islander, and other medically underserved patients and communities while supporting the clinicians who treat them. Outreach to other organizations that serve historically underrepresented racial and ethnic minorities will strengthen the foundation of Heart Rhythm Society initiatives and programmatic activities that have the potential to reduce health inequities while improving the professional experience of patients and clinicians.

Conclusion

Racial and ethnic minority individuals face significant inequities in arrhythmia care. Differences in the arrhythmogenic substrate, comorbidities, management approaches, SDOH, and access to health care as well as structural racism are important contributing factors. A systematic approach to improve access to health care among racial and ethnic groups that have been economically and socially marginalized, promote disease awareness, provide patient education to improve health literacy, optimize clinician education and attitudes, enhance cultural humility, and intensify efforts and invest more resources to engage patients at the community level may reduce these inequalities. Efforts should be made to increase the presence of racial and ethnic researchers in clinical trial leadership and intentionally plan for the inclusion of racial and ethnic minorities with recruitment strategies rooted in community engagement, training to reduce implicit bias among study teams, and simplified processes for informed consent and longitudinal participation. Racial and ethnic minorities must also be made aware of the efforts being made to tackle inequalities in health care and outcomes. Multistakeholder engagement through legislation, education, resource appropriation, and commitment to transform the status quo can empower the Heart Rhythm Society to continue working toward equitable health care for all racial and ethnic groups with heart rhythm disorders.

We, as a professional cardiovascular society, in collaboration with other medical societies, clinicians, researchers, governmental agencies, and policy makers, should lay foundations to build a better health care community and overcome social, cultural, and structural barriers to promote positive cardiovascular health with a common goal of “Health Equality for All: A Right Not a Privilege.”

ABBREVIATIONS

AF	atrial fibrillation
CIED	cardiac implantable electronic device
CRT	cardiac resynchronization therapy
DOAC	direct oral anticoagulant
ICD	implantable cardioverter-defibrillator
LAAO	left atrial appendage occlusion

SDOH	social determinants of health
SCD	sudden cardiac death
SNP	single nucleotide polymorphism

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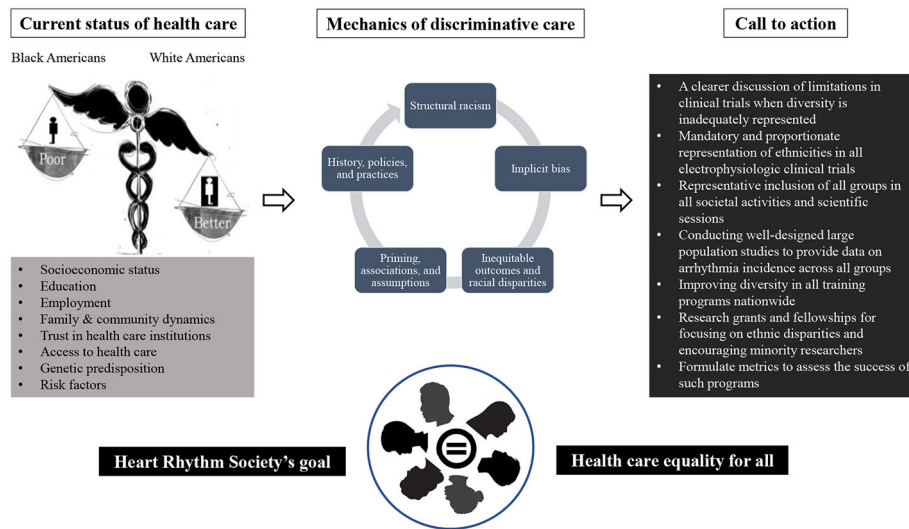


Figure 1.
Racial and ethnic disparities in arrhythmia care: A call for action.

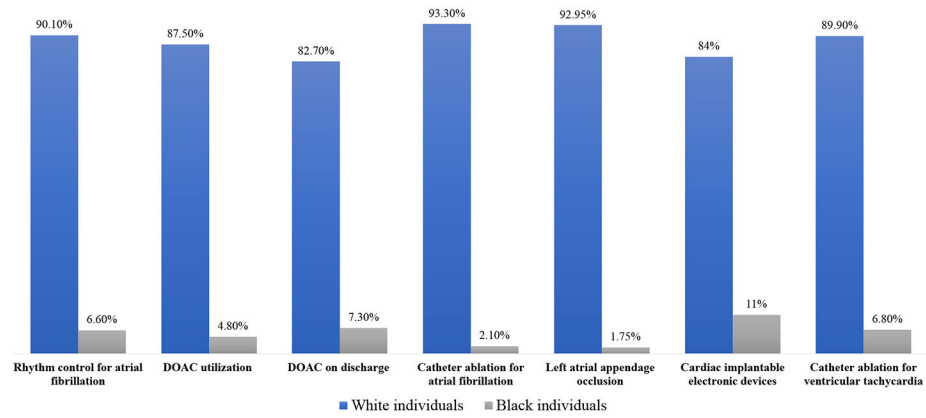


Figure 2.

Ethnic disparities in therapeutic electrophysiological interventions between White and Black individuals in landmark clinical trials (% = population percentages representation in the trials). DOAC = direct oral anticoagulant.

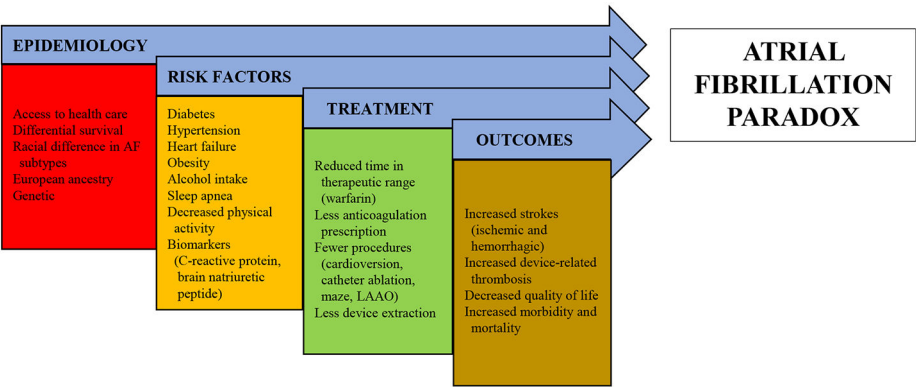


Figure 3. Atrial fibrillation paradox in Black individuals. Despite increased predominance of traditional atrial fibrillation (AF) risk factors (ie, diabetes, hypertension, heart failure, obesity, pericardial fat pad, and smoking), Black individuals have low prevalence of atrial fibrillation, which is termed the “atrial fibrillation racial paradox.” LAAO = left atrial appendage occlusion.

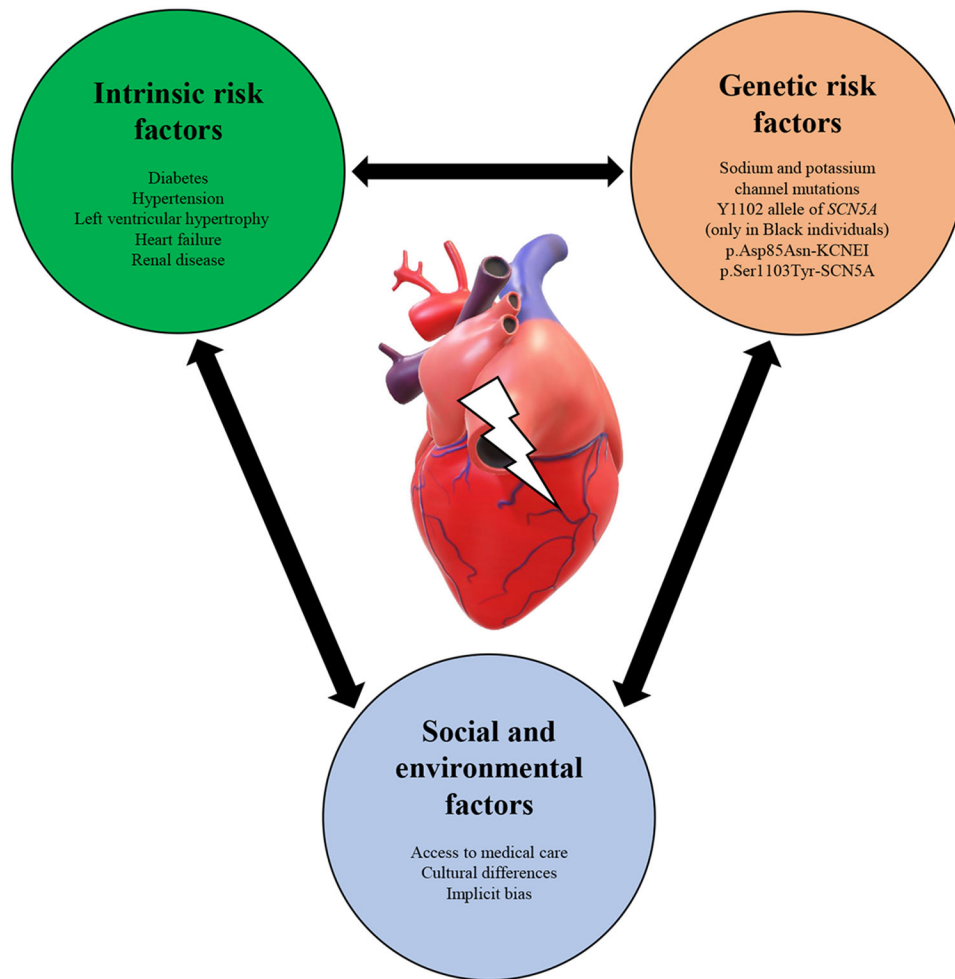


Figure 4. Complex interplay of risk factors leading to an increased risk of ventricular arrhythmias and sudden cardiac death in Black individuals.

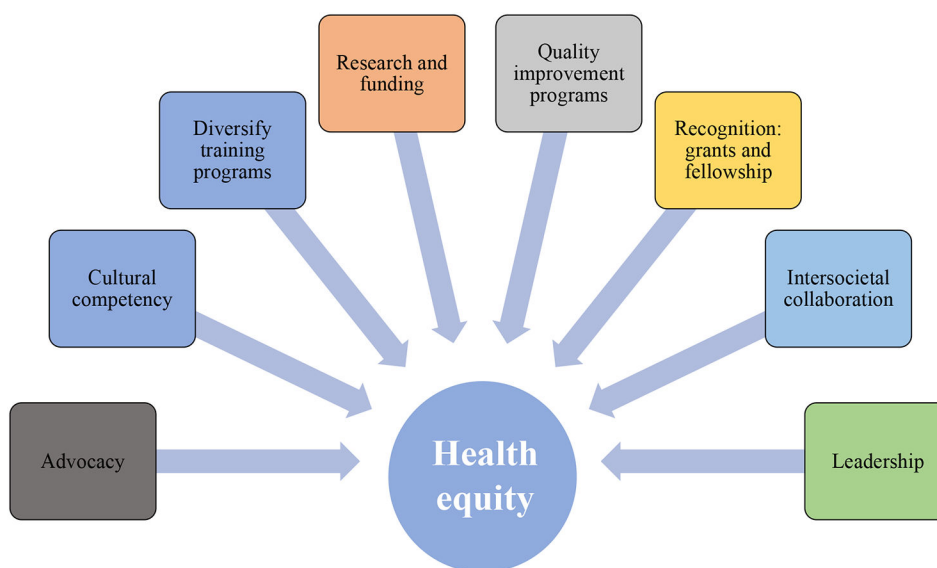


Figure 5. Actionable steps to address structural racism to not only improve the engagement of racial and ethnic minority patients in health care research but also create health equity.

Table 1

Key ethnic differences in cardiac arrhythmias in Black individuals relative to White individuals

Disease factors	Black individuals compared with White individuals
<i>Atrial fibrillation</i>	
Atrial fibrillation	
Conventional risk factors	↑
Novel risk factors	↑
Biomarkers	↑
Atrial fibrillation prevalence	↓
Genetic factors	Greater European ancestry: increased AF risk Single nucleotide polymorphism on 10q22 SNP is protective against AF in Black individuals as compared with White individuals
Atrial fibrillation–related morbidity and mortality	↑
Ischemic stroke	↑
Thromboembolic prophylaxis	
Warfarin	↓
Direct oral anticoagulants	↓
Left atrial appendage occlusion	↓
Device-related thrombosis	↑
Rate control strategy	↑
Rhythm control strategy	
Antiarrhythmic drug	↑
Direct current cardioversion	↓
Catheter ablation	↓
Cox maze procedure	↓
<i>Ventricular arrhythmias</i>	

Disease factors		Black individuals compared with White individuals
Sudden cardiac death or cardiac		↑
Nonshockable rhythm		↑
Survival post–cardiac arrest		↓
Survival to hospital discharge		↓
Genetic factors	Single nucleotide polymorphism in Y1102 allele of <i>SCN5A</i> gene (absent in White individuals); associated with an increased risk of sudden cardiac death	
p.Asp85Asn-KCNE1 and p.Ser1103Tyr-SCN5A		↑
Catheter ablation for ventricular tachycardia		↓
Cardiac implantable electronic devices		
Leadless pacemaker		↓
Implantable cardioverter defibrillator		
Primary prevention		↓
Secondary prevention		↓
Cardiac resynchronization therapy		↓
Device/lead extraction		↓
Inherited primary arrhythmia syndromes and cardiomyopathies		
Long QT syndrome		↓
	Limited data	
Short QT syndrome	Unknown	
Brugada syndrome	Unknown	
Catecholaminergic polymorphic ventricular tachycardia	Unknown	
J-wave syndrome (early repolarization)		↑
	No increased risk of sudden cardiac death	
Progressive conduction disease	Unknown	
Idiopathic ventricular fibrillation	Unknown	
Hypertrophic cardiomyopathy		↑
	Concentric hypertrophy (septal and apical hypertrophy with deep T-wave inversion in lateral leads)	

Disease factors	Black individuals compared with White individuals
Arrhythmogenic right ventricular cardiomyopathy	Unknown

AF = atrial fibrillation; SNP = single nucleotide polymorphism.

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Author disclosures

Name	Employment	Honoraria/Speaking/Consulting	Speakers' bureau	Research*	Fellowship support*	Ownership/Partnership/Principal/Majority stockholder	Stock or stock options	Intellectual property/Royalties	Other
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Number value: **0** = \$0; **1** = ≤ \$10,000; **2** = > \$10,000 to ≤ \$25,000; **3** = > \$25,000 to ≤ \$50,000; **4** = > \$50,000 to ≤ \$100,000; **5** = > \$100,000 to ≤ \$200,000; **6** = \$200,000 to ≤ \$300,000; **7** = > \$300,000 to ≤ \$400,000; **8** = > \$400,000.

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