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# Disparities in cardiovascular care: Past, present, and solutions

## ABSTRACT

Cardiovascular disease has been the leading cause of death in the United States since the early 20th century. With advances in prevention and treatment, cardiovascular mortality rates are on the decline. Nevertheless, disparities in care persist, with devastating impact in select populations in the United States. This paper reviews the impact of disparate care on risk-factor burden, coronary artery disease, heart failure, and cardiovascular research.

## KEY POINTS

Although avoidable deaths from heart disease, stroke, and hypertensive disease have declined overall, African Americans still have a higher mortality rate than other racial and ethnic groups.

The prevalence of modifiable risk factors for cardiovascular disease is higher in African Americans than in the general US population.

Disparities in care exist and may persist even with equal access to care.

Since 1993, studies funded by the National Institutes of Health must include minorities that were historically underrepresented in clinical research trials.

Solutions to disparities will need to eliminate healthcare bias, increase patient access, and increase diversity and inclusion in the physician work force.

Cardiovascular disease makes no distinction in race, sex, age, or socioeconomic status, and neither should the medical community.

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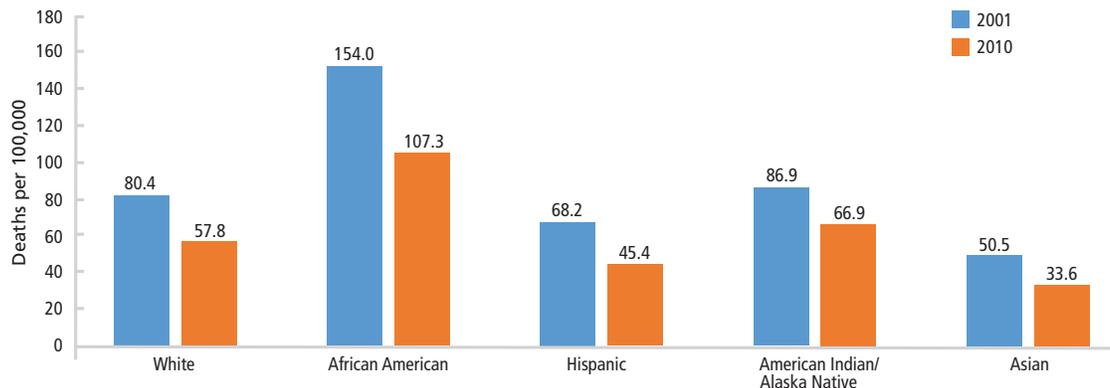
CARDIOVASCULAR DISEASE became the leading cause of death in the United States in the early 20th century, and it accounts for nearly half of all deaths in industrialized nations.<sup>1</sup> The mortality it inflicts was thought to be shared equally between both sexes and among all age groups and races.<sup>2</sup> The cardiology community implemented innovative epidemiologic research, through which risk factors for cardiovascular disease were established.<sup>1</sup> The development of coronary care units reduced in-hospital mortality from acute myocardial infarction from 30% to 15%.<sup>2-5</sup> Further advances in pharmacology, revascularization, and imaging have aided in the detection and treatment of cardiovascular disease.<sup>6</sup> Though cardiovascular disease remains the number-one cause of death worldwide, rates are on the decline.<sup>7</sup>

For several decades, health disparities have been recognized as a source of pathology in cardiovascular medicine, resulting in inequity of care administration among select populations. In this review, we examine whether the same forward thinking that has resulted in a decline in cardiovascular disease has had an impact on the pervasive disparities in cardiovascular medicine.

## DISPARITIES DEFINED

Compared with whites, members of minority groups have a higher burden of chronic diseases, receive lower quality care, and have less access to medical care. Recognizing the potential public health ramifications, in 1999 the US Congress tasked the Institute of Medicine to study and assess the extent of healthcare disparities. This led to the landmark publication, *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care*.<sup>8</sup>

## DISPARITIES IN CARDIOVASCULAR CARE



**Figure 1.** Avoidable deaths from heart disease, stroke, and hypertensive disease, 2001 and 2010.

Data from US Centers for Disease Control and Prevention, reference 11

The Institute of Medicine defines disparities in healthcare as racial or ethnic differences in the quality of healthcare that are not due to access-related factors, clinical needs, preferences, and appropriateness of intervention.<sup>8</sup> Disparities can also exist according to socioeconomic status and sex.<sup>9</sup>

In an early study documenting the concept of disparities in cardiovascular disease, Stone and Vanzant<sup>10</sup> concluded that heart disease was more common in African Americans than in whites, and that hypertension was the principal cause of cardiovascular disease mortality in African Americans.

Although avoidable deaths from heart disease, stroke, and hypertensive disease declined between 2001 and 2010, African Americans still have a higher mortality rate than other racial and ethnic groups (Figure 1).<sup>11</sup>

### DISPARITIES AND CARDIOVASCULAR HEALTH

The concept of cardiovascular health was established by the American Heart Association (AHA) in efforts to achieve an additional 20% reduction in cardiovascular disease-related mortality by 2020.<sup>7</sup> Cardiovascular health is defined as the absence of clinically manifest cardiovascular disease and is measured by 7 components:

- Not smoking or abstaining from smoking for at least 1 year
- A normal body weight, defined as a body mass index less than 25 kg/m<sup>2</sup>
- Optimal physical activity, defined as 75

minutes of vigorous physical activity or 150 minutes of moderate-intensity physical activity per week

- Regular consumption of a healthy diet
- Total cholesterol below 200 mg/dL
- Blood pressure less than 120/80 mm Hg
- Fasting blood sugar below 100 mg/dL.

Nearly 70% of the US population can claim 2, 3, or 4 of these components, but differences exist according to race,<sup>12</sup> and 60% of adult white Americans are limited to achieving no more than 3 of these healthy metrics, compared with 70% of adult African Americans and Hispanic Americans.

### Smoking

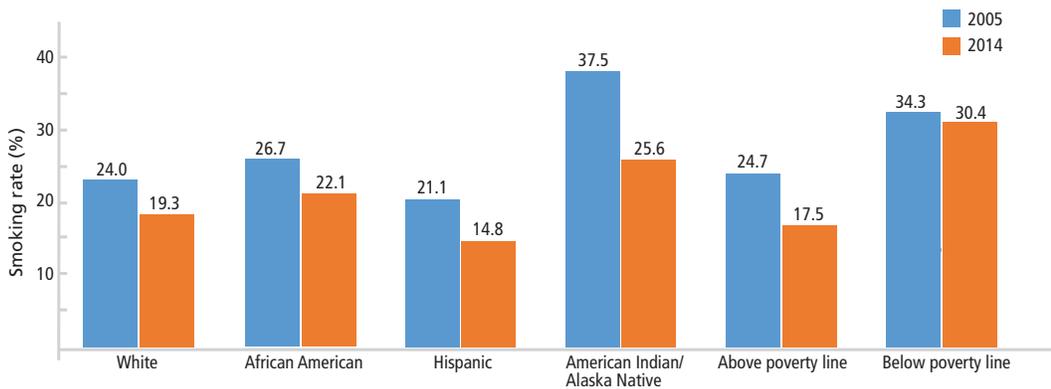
Smoking is a major risk factor for cardiovascular disease.<sup>12-14</sup>

During adolescence, white males are more likely to smoke than African American and Hispanic males,<sup>12</sup> but this trend reverses in adulthood, when African American men have a higher prevalence of smoking than white men (21.4% vs 19%).<sup>7</sup> Rates of lifetime use are highest among American Indian or Alaskan natives and whites (75.9%), followed by African Americans (58.4%), native Hawaiians (56.8%), and Hispanics (56.7%).<sup>15</sup> Trends for current smoking are similar (Figure 2).<sup>16</sup> Moreover, households with lower socioeconomic status have a higher prevalence of smoking.<sup>7</sup>

### Physical activity

People with a sedentary lifestyle are more likely to die of cardiovascular disease. As many as 250,000 deaths annually in the

**Smoking rates are highest in American Indians and Alaska Natives**



**Figure 2.** Percentage of adults who are active smokers, 2005 and 2014.

Data from National Health Interview Surgery, Jamal et al, reference 16.

United States are attributed to lack of regular physical activity.<sup>17</sup>

Recognizing the potential public health ramifications, the AHA and the 2018 Federal Guidelines on Physical Activity recommend that children engage in 60 minutes of daily physical activity and that adults participate in 150 minutes of moderate-intensity or 75 minutes of vigorous physical activity weekly.<sup>18,19</sup>

In the United States, 15.2% of adolescents reported being physically inactive, according to data published in 2016.<sup>7</sup> Similar to most cardiovascular risk factors, minority populations and those of lower socioeconomic status had the worst profiles. The prevalence of physical inactivity was highest in African Americans and Hispanics (**Figure 3**).<sup>20</sup>

Studies have shown an association between screen-based sedentary behavior (computers, television, and video games) and cardiovascular disease.<sup>21–23</sup> In the United States, 41% of adolescents used computers for activities other than homework for more than 3 hours per day on a school day.<sup>7</sup> The pattern of use was highest in African American boys and African American girls, followed by Hispanic girls and Hispanic boys.<sup>18</sup> Trends were similar with regard to watching television for more than 3 hours per day.

Sedentary behavior persists into adulthood, with rates of inactivity of 38.3% in African Americans, 40.1% in Hispanics, and 26.3% in white adults.<sup>7</sup>

**Nutrition and obesity**

Nutrition plays a major role in cardiovascular disease, specifically in the pathogenesis of ath-

erosclerotic disease and hypertension.<sup>24</sup> Most Americans do not meet dietary recommendations, with minority communities performing worse in specific metrics.<sup>7</sup>

Dietary patterns are reflected in the rate of obesity in this nation. Studies have shown a direct correlation between obesity and cardiovascular disease such as coronary artery disease, heart failure, and atrial fibrillation.<sup>25–28</sup> According to data from the National Health and Nutrition Examination Survey (NHANES), 31% of children between the ages of 2 and 19 years are classified as obese or overweight. The highest rates of obesity are seen in Hispanic and African American boys and girls. The obesity epidemic is disproportionately rampant in children living in households with low income, low education, and high unemployment rates.<sup>7,29–31</sup>

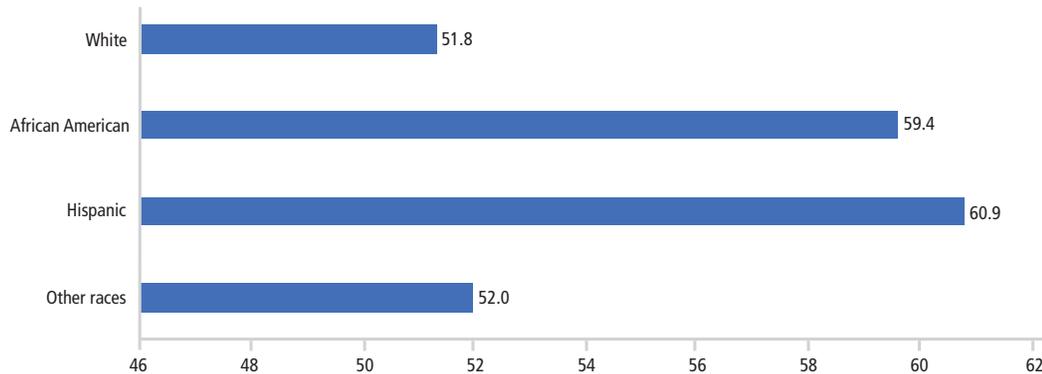
Despite the risks associated with obesity, only 64.8% of obese adults report being informed by a doctor or health professional that they were overweight. The proportion of obese adults informed that they were overweight was significantly lower for African Americans and Hispanics compared with whites. Similar differences are seen based on socioeconomic status, as middle-income patients were less likely to be informed than those in the higher income strata (62.4% vs 70.6%).<sup>7,31</sup>

**Blood pressure**

Hypertension is a well-established risk factor for cardiovascular disease and stroke, and a blood pressure of 120/80 mm Hg or lower is identified as a component of ideal cardiovascular health.

**Physical inactivity is highest in Hispanics and African Americans**

## DISPARITIES IN CARDIOVASCULAR CARE



**Figure 3.** Prevalence of inactivity<sup>a</sup> in the United States, 2013.

<sup>a</sup>Percentage of US adults eligible for intensive behavioral counseling for cardiovascular disease prevention and not meeting aerobic exercise guideline

Data from Behavioral Risk Factor Surveillance System, Omura et al, reference 20

**The prevalence of diabetes mellitus in African Americans is almost twice as high as in whites**

In the United States the prevalence of hypertension in adults older than 20 is 32%.<sup>7</sup> The prevalence of hypertension in African Americans is among the highest in the world.<sup>32,33</sup> African Americans develop high blood pressure at earlier ages, and their average resting blood pressures are higher than in whites.<sup>34,35</sup> For a 45-year-old without hypertension, the 40-year risk of developing hypertension is 92.7% for African Americans and 86% for whites.<sup>35</sup> Hypertension is a major risk factor for stroke, and African Americans have a 1.8 times greater rate of fatal stroke than whites.<sup>7</sup>

In 2013 there were 71,942 deaths attributable to high blood pressure, and the 2011 death rate associated with hypertension was 18.9 per 100,000. By race, the death rate was 17.6 per 100,000 for white males and an alarming 47.1 per 100,000 for African American males; rates were 15.2 per 100,000 for white females and 35.1 per 100,000 for African American females.<sup>7</sup>

It is unclear what accounts for the racial difference in prevalence in hypertension. Studies have shown that African Americans are more likely than whites to have been told on more than 2 occasions that they have hypertension. And 85.7% of African Americans are aware that they have high blood pressure, compared with 82.7% of whites.<sup>14</sup>

African Americans and Hispanics have poorer hypertension control compared with whites.<sup>36,37</sup> These observed differences cannot be attributed to access alone, as African Americans were more likely to be on higher-

intensity blood pressure therapy, whereas Hispanics were more likely to be undertreated.<sup>36,38</sup> In a meta-analysis of 13 trials, Peck et al<sup>39</sup> showed that African Americans showed a lesser reduction in systolic and diastolic blood pressure when treated with angiotensin-converting enzyme (ACE) inhibitors.

The 2017 American College of Cardiology (ACC) and AHA guidelines for the prevention, detection, evaluation, and management of high blood pressure in adults<sup>40</sup> identifies 4 drug classes as reducing cardiovascular disease morbidity and mortality: thiazide diuretics, ACE inhibitors, angiotensin II receptor blockers (ARBs), and calcium channel blockers. Of these 4 classes, thiazide diuretics and calcium channel blockers have been shown to lower blood pressure more effectively in African Americans than renin-angiotensin-aldosterone inhibition with ACE inhibitors or ARBs.

### Glycemic control

Type 2 diabetes mellitus secondary to insulin resistance disproportionately affects minority groups, as the prevalence of diabetes mellitus in African Americans is almost twice as high as that in whites, and 35% higher in Hispanics compared with whites.<sup>7,41</sup> Based on NHANES data between 1984 and 2004, the prevalence of diabetes mellitus is expected to increase by 99% in whites, 107% in African Americans, and 127% in Hispanics by 2050. Alarming, African Americans over age 75 are expected to experience a 606% increase by 2050.<sup>42</sup>

With regard to mortality, 21.7 deaths per 100,000 population were attributable to diabetes mellitus according to reports by the AHA in 2016. The death rate in white males was 24.3 per 100,000 compared with 44.9 per 100,000 for African Americans males. The associated mortality rate for white women was 16.2 per 100,000, and 35.8 per 100,000 for African American females.<sup>7</sup>

**DISPARITIES AND CORONARY ARTERY DISEASE CARE**

The management of coronary artery disease has evolved from prolonged bed rest to surgical, pharmacologic, and percutaneous revascularization.<sup>2,5</sup> Coronary revascularization procedures are now relatively common: 950,000 percutaneous coronary interventions and 397,000 coronary artery bypass procedures were performed in 2010.<sup>7</sup>

Nevertheless, despite similar clinical presentations, African Americans with acute myocardial infarction were less likely to be referred for coronary artery bypass grafting than whites.<sup>43-46</sup> They were also less likely to be given thrombolytics<sup>47</sup> and less likely to undergo coronary angiography with percutaneous coronary intervention.<sup>48</sup> Similar differences have been reported when comparing Hispanics with whites.<sup>49</sup>

Some suggest that healthcare access is a key mediator of health disparities.<sup>50</sup> In 2009, Hispanics and African Americans accounted for more than 50% of those without health insurance.<sup>51</sup> Improved access to healthcare might mitigate the disparity in revascularizations.

Massachusetts was one of the first states to mandate that all residents obtain health insurance. As a result, the uninsured rates declined in African Americans and Hispanics in Massachusetts, but a disparity in revascularization persisted. African Americans and Hispanics were 27% and 16% less likely to undergo revascularization procedures (coronary artery bypass grafting or percutaneous coronary intervention) than whites,<sup>51</sup> suggesting that disparities in revascularization are not solely secondary to healthcare access.

These findings are consistent with a 2004 Veterans Administration study,<sup>52</sup> in which healthcare access was equal among races. The

study showed that African Americans received fewer cardiac procedures after an acute myocardial infarction compared with whites.

Have we made progress? The largest disparity between African Americans and whites in coronary artery disease mortality existed in 1990. The disparity persisted to 2012, and although decreased, it is projected to persist to 2030.<sup>53</sup>

**DISPARITIES IN HEART FAILURE**

An estimated 5.7 million Americans have heart failure, and 915,000 new cases are diagnosed annually.<sup>7</sup> Unlike coronary artery disease, heart failure is expected to increase in prevalence by 46%, to 8 million Americans with heart failure by 2030.<sup>7,54</sup>

Our knowledge of disparities in the area of heart failure is derived primarily from epidemiologic studies. The Multi-Ethnic Study of Atherosclerosis<sup>55</sup> showed that African Americans (4.6 per 1,000), followed by Hispanics (3.5 per 1,000) had a higher risk of developing heart failure compared with whites (2.4 per 1,000). The higher risk is in part due to disparities in socioeconomic status and prevalence of hypertension, as African Americans accounted for 75% of cases of nonischemic-related heart failure.<sup>55</sup> African Americans also have a higher 5-year mortality rate than whites.<sup>55</sup>

Even though the 5-year mortality rate in heart failure is still 50%, the past 30 years have seen innovations in pharmacologic and device therapy and thus improved outcomes in heart failure patients. Still, significant gaps in the use of guideline-recommended therapies, quality of care, and clinical outcomes persist in contemporary practice for racial minorities with heart failure.

**Disparities in inpatient care for heart failure**

Patients admitted for heart failure and cared for by a cardiologist are more likely to be discharged on guideline-directed medical therapy, have fewer heart failure readmissions, and lower mortality.<sup>56,57</sup> Breathett et al,<sup>58</sup> in a study of 104,835 patients hospitalized in an intensive care unit for heart failure, found that primary intensive care by a cardiologist was associated with higher survival in both races. However, in the same study, white patients had a higher odds of receiving care from a cardiologist than African American patients.

**Even in a VA study, African Americans with acute myocardial infarction received fewer cardiac procedures than whites**

**Disparities and cardiac resynchronization therapy devices**

In one-third of patients with heart failure, conduction delays result in dyssynchronous left ventricular contraction.<sup>59</sup> Dyssynchrony leads to reduced cardiac performance, left ventricular remodeling, and increased mortality.<sup>56</sup>

Cardiac resynchronization therapy (CRT) was approved for clinical use in 2001, and studies have shown that it improves quality of life, exercise tolerance, cardiac performance, and morbidity and mortality rates.<sup>59-66</sup> The 2013 ACC/AHA guidelines for the management of heart failure give a class IA recommendation (the highest) for its use in patients with a left ventricular ejection fraction of 35% or less, sinus rhythm, left bundle branch block and a QRS duration of 150 ms or greater, and New York Heart Association class II, III, or ambulatory IV symptoms while on guideline-directed medical therapy.<sup>67</sup>

Despite these recommendations, racial differences are observed. A study using the Nationwide Inpatient Sample database<sup>59</sup> showed that between 2002 and 2010, a total of 374,202 CRT devices were implanted, averaging 41,578 annually. After adjusting for heart failure admissions, the study showed that CRT use was favored in men and in whites.

Another study, using the National Cardiovascular Data Registry,<sup>68</sup> looked at patients who received implantable cardiac defibrillators (ICDs) and were eligible to receive CRT. It found that African Americans and Hispanics were less likely than whites to receive CRT, even though they were more likely to meet established criteria.

**Disparities and left ventricular assist devices**

The Randomized Evaluation of Mechanical Assistance for the Treatment of Congestive Heart failure (REMATCH) trial and Heart Mate II trial demonstrated that left ventricular assist devices (LVADs) were durable options for long-term support for patients with end-stage heart failure.<sup>69,70</sup> Studies that examined the role of race and clinical outcomes after LVAD implantation have reported mixed findings.<sup>71,72</sup> Few studies have looked at the role racial differences play in accessing LVAD therapy.

Joyce et al<sup>73</sup> reviewed data from the Nationwide Inpatient Sample from 2002 to 2003 on patients admitted to the hospital with a primary diagnosis of heart failure or cardiogenic shock. A total of 297,866 patients were included in the study, of whom only 291 underwent LVAD implantation. A multivariate analysis found that factors such as age over 65, female sex, admission to a nonacademic center, geographic region, and African American race adversely influenced access to LVAD therapy.

Breathett et al<sup>74</sup> evaluated racial differences in LVAD implantations from 2012 to 2015, a period that corresponds to increased health insurance expansion, and found LVAD implantations increased among African American patients with advanced heart failure, but no other racial or ethnic group.

**Disparities and heart transplant**

For patients with end-stage heart failure, orthotopic heart transplant is the most definitive and durable option for long-term survival. According to data from the United Network for Organ Sharing, 62,508 heart transplants were performed from January 1, 1988 to December 31, 2015. Compared with transplants of other solid organs, heart transplant occurs in significantly infrequent rates.

Barriers to transplant include lack of health insurance, considered a surrogate for low socioeconomic status. Hispanics and African Americans are less likely to have private health insurance than non-Hispanic whites, and this difference is magnified among the working poor.

Despite these perceived barriers, Kilic et al<sup>75</sup> found that African Americans comprised 16.4% of heart transplant recipients, although they make up only approximately 13% of the US population. They also had significantly shorter wait-list times than whites. On the negative side, African Americans had a higher unadjusted mortality rate than whites (15% vs 12%  $P = .002$ ). African Americans also tended to receive their transplants at centers with lower transplant volumes and higher transplant mortality rates.

Several other studies also showed that African Americans compared to whites have significantly worse outcomes after transplant.<sup>76-79</sup>

**Heart failure in African Americans is more often due to hypertension than infarction**

What accounts for this difference? Kilic et al<sup>75</sup> showed that African Americans had the lowest proportion of blood type matching and lowest human leukocyte antigen matching, were younger (because African Americans develop more advanced heart failure at younger ages), had higher serum creatinine levels, and were more often bridged to transplant with an LVAD.

**DISPARITIES IN CARDIOVASCULAR RESEARCH**

Although the United States has the most sophisticated and robust medical system in the world, select groups have significant differences in delivery and healthcare outcomes. There are many explanations for these differences, but a contributing factor may be the paucity of research dedicated to understand racial and ethnic differences.<sup>80</sup>

Differences observed in epidemiologic studies may be secondary to pathophysiology, genetic differences, environment, and lifestyle choices. Historically, clinical trials were conducted in homogeneous populations with respect to age (middle-aged), sex (male), and race (white), and the results were generalized to heterogeneous populations.<sup>80</sup>

Disparities in research have implications in clinical practice. Overall, the primary cause of heart failure is ischemia; however, in African Americans, the primary cause is hypertensive heart disease.<sup>81</sup> Studies in hypertension have shown that African Americans have less of a response to neurohormonal blockade with ACE inhibitors and beta-blockers than non-African Americans.<sup>82</sup> Nevertheless, neurohormonal blockade has become the cornerstone of heart failure treatment.

Retrospective analysis of the Vasodilator-Heart Failure trials<sup>83</sup> showed that treatment with isosorbide dinitrate plus hydralazine, compared with placebo, conferred a survival benefit for African Americans but not whites.<sup>80</sup> No survival advantage was noted when isosorbide dinitrate/hydralazine was compared to enalapril in African Americans, although enalapril was superior to isosorbide dinitrate in whites.<sup>45</sup> These observations were recognized 10 to 15 years after trial completion, and were only possible because the trials

included sufficient numbers of African American patients to complete analysis.

In 1993, the US Congress passed the National Institutes of Health (NIH) Revitalization Act, which established guidelines requiring NIH grant applicants to include minorities in human subject research, as they were historically underrepresented in clinical research trials.<sup>84,85</sup>

In 2001, the Beta-Blocker Evaluation of Survival Trial<sup>86</sup> reported its results investigating whether bucindolol, a nonselective beta-blocker, would reduce mortality in patients with advanced heart failure (New York Heart Association class III or IV). This was one of the first trials to prospectively investigate racial and ethnic differences in response to treatment. Though it showed no overall benefit in the use of bucindolol in the treatment of advanced heart failure, subgroup analysis showed that whites did enjoy a benefit in terms of lower mortality, whereas African Americans did not.

Results of the Vasodilator-Heart Failure trials led to further population-directed research, most notably the African American Heart Failure Trial,<sup>87</sup> a double-blind, placebo-controlled, randomized trial in patients who identified as African American. Patients who were randomized to receive a fixed dose of hydralazine and isosorbide dinitrate had a 43% lower mortality rate, a 33% lower hospitalization rate for heart failure, and better quality of life than patients in the placebo group, leading to early termination of the trial. The outcomes suggested that the combination of isosorbide dinitrate and hydralazine treats heart failure in a manner independent of pure neurohormonal blockade.

**CHALLENGES IN STUDY PARTICIPATION**

Recruitment of minority participants in biomedical research is a challenging task for clinical investigators.<sup>88,89</sup> Some of the factors thought to pose potential barriers for racial and ethnic minority participation in health research include poor access to primary medical care, failure of researchers to recruit minority populations actively, and language and cultural barriers.<sup>90</sup>

Further, it is widely claimed that African

**Historically, clinical trials were conducted in middle-aged white males**

Americans are less willing than nonminority individuals to participate in clinical research trials due to general distrust of the medical community as a result of the Tuskegee Syphilis Experiment.<sup>91</sup> That infamous study, conducted by the US Public Health Service between 1932 and 1972, sought to record the natural progression of untreated syphilis in poor African American men in Alabama. The participants were not informed of the true purpose of the study, and they were under the impression that they were simply receiving free healthcare from the US government. Further, they were denied appropriate treatment even after it became readily available, in order for researchers to observe the progression of the disease.

While the 1993 mandate did in fact increase pressure on researchers to develop strategies to overcome participation barriers, the issue of underrepresentation of racial minorities in clinical research, including cardiovascular research, has not been resolved and continues to be a problem today.

The overall goal of clinical research is to determine the best strategies to prevent and treat disease. But if the study population is not representative of the affected population at large, the results cannot be generalized to underrepresented subgroups. The implications of underrepresentation in research are far-reaching, and can further contribute to disparate care of minority patients such as African Americans, who have a higher prevalence of cardiovascular risk factors and greater burden of heart failure.

### ■ PROPOSING SOLUTIONS

Between 1986 and 2018, according to a PUBMED search, 10,462 articles highlighted the presence of a health-related disparity. Solutions to address and ultimately eradicate disparities will need to eliminate healthcare bias, increase patient access, and increase diversity and inclusion in the physician work force.

#### Eliminating bias

Implicit bias refers to attitudes, thoughts, and feelings that exist outside of the conscious awareness.<sup>92</sup> These biases can be triggered by race, gender, or socioeconomic status. They have manifested in society as stereotypes that

men are more competent than women, women are more verbal than men, and African Americans are more athletic than whites.<sup>93</sup>

The concept of implicit bias is important, in that the populations that experience the greatest health disparities also suffer from negative cultural stereotypes.<sup>94</sup> Healthcare professionals are not inoculated against implicit bias.<sup>95</sup> Studies have shown that most healthcare providers have implicit biases that reflect positive attitudes toward whites and negative attitudes toward people of color.<sup>92,94,96-98</sup>

The Implicit Association Test, introduced in 1998, is widely used to measure implicit bias. It measures response time of subjects to match particular social groups to particular attributes.<sup>99</sup> Green et al,<sup>99</sup> using this test, showed that although physicians reported no explicit preference for white vs African American patients or differences in perceived cooperativeness, the test revealed implicit preference favoring white Americans and implicit stereotypes of African Americans as less cooperative for medical procedures and in general. This also manifested in clinical decision-making, as white Americans were more likely, and African Americans less likely, to be treated with thrombolysis.<sup>99</sup>

Sabin et al<sup>100</sup> showed that implicit bias was present among pediatricians, although less than in society as a whole and in other healthcare professionals.

But how does one change feelings that exist outside of the conscious awareness? Green et al<sup>99</sup> showed that making physicians aware of their susceptibility to bias changed their behavior. A subset of physicians who were made aware that bias was a focus of the study were more likely to refer African Americans for thrombolysis even if they had a high degree of implicit pro-white bias.<sup>94,100</sup> Perhaps mandating that all healthcare providers take a self-administered and confidentially reported Implicit Association Test will lead to awareness of implicit bias and minimize healthcare behaviors that contribute to the current state of disparities.

#### Improving access

Common indicators of access to healthcare include health insurance status, having a usual source of healthcare, and having a regular

**Most healthcare providers have implicit biases for whites and against people of color**

physician.<sup>101</sup> Health insurance does offer protection from the costs associated with illness and health maintenance.<sup>101</sup> It is also a major contributing factor in racial and ethnic disparities.

Chen et al<sup>102</sup> examined the effects of the Affordable Care Act and found that it was associated with reduction in the probability of being uninsured, delaying necessary care, and forgoing necessary care, and increased probability of having a physician. However, earlier studies showed that access to health insurance by itself does not equate to equitable care.<sup>103,104</sup>

### Diversifying the work force

African Americans comprise 4% of physicians and Hispanic Americans 5%, despite accounting for 13% and 16% of the US population.<sup>105</sup> This underrepresentation has led to African American and Hispanic American patients being more likely than white patients to be treated by a physician from a dissimilar racial or ethnic background.<sup>106</sup> Studies have shown that minority patients in a race- or ethnic-concordant relationship are more likely to use needed health services, less likely to postpone seeking care, and report greater satisfaction.<sup>106,107</sup> Minority physicians often locate and practice in neighborhoods with high minority populations, and they disproportion-

ately care for disadvantaged patients of lower socioeconomic status and poorer health.<sup>106,108</sup>

### ■ WE ARE STILL IN THE TUNNEL, BUT THERE IS LIGHT AT THE END

The cardiovascular community has faced tremendous challenges in the past and responded with innovative research that has led to imaging that aids in the diagnosis of subclinical cardiovascular disease and invasive and pharmacologic strategies that have improved cardiovascular outcomes. One may say that there is light at the end of the tunnel; however, the existence of disparate care reminds us that we are still in the tunnel.

Disparities in cardiovascular disease management present a unique challenge for the community. There is no drug, device, or invasive procedure to eliminate this pathology. However, by acknowledging the problem and implementing changes at the system, provider, and patient level, the cardiovascular community can achieve yet another momentous achievement: the end of cardiovascular health disparities. Cardiovascular disease makes no distinction in race, sex, age, or socioeconomic status, and neither should the medical community. ■

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