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Racial and Ethnic Disparities in Heart Failure:

Current State and Future Directions

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Abstract

Purpose of Review: This review discusses the current state of racial and ethnic inequities in heart failure burden, outcomes, and management. This review also frames considerations for bridging disparities to optimize quality heart failure care across diverse communities.

Recent Findings: Treatment options for heart failure have diversified and overall heart failure survival has improved with the advent of effective pharmacologic and non-pharmacologic therapies. With increased recognition, some racial/ethnic disparity gaps have narrowed whereas others in heart failure outcomes, utilization of therapies, and advanced therapy access persist or worsen.

Summary: Racial and ethnic minorities have the highest incidence, prevalence, and hospitalization rates from heart failure. In spite of improved therapies and overall survival, the mortality disparity gap in African American patients has widened over time. Racial/ethnic inequities in access to cardiovascular care, utilization of efficacious guideline-directed heart failure therapies, and allocation of advanced therapies may contribute to disparate outcomes. Strategic and earnest interventions considering social and structural determinants of health are critically needed to bridge racial/ethnic disparities, increase dissemination and implementation of preventative and therapeutic measures, and collectively improve the health and longevity of patients with heart failure.

Keywords

heart failure; cardiovascular disease; outcomes; race; ethnic groups; disparities; health equity

Introduction:

Heart failure (HF) affects 6.2 million U.S. adults and remains a leading cause of death and morbidity.[1] As the population ages, HF prevalence is expected to exceed 8 million, impacting 1 in every 33 U.S. adults over the next decade.[1, 2] By 2030, HF total costs are

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anticipated to top $69.8 billion, representing a vast and pressing public health concern.[1, 2] Racial and ethnic minorities are disproportionately impacted by HF burden and racial disparities in HF care and outcomes have long been enumerated in the literature. In spite of rapid pharmacologic and therapeutic advancement in HF care and notable gains in overall HF survival, racial and ethnic disparities in HF burden and outcomes persist.[1]

Race, Ethnicity, and Disparity

Central to the discussion of racial disparities in HF are the concepts of race and health disparities. Race is perhaps best described as a sociocultural construct that aligns groups of people by self-identified or socially perceived physical criteria. Race itself is without an inherent genetic or physiologic basis.[3, 4] Genome research has determined that human beings are 99.9% similar, and the 0.1% variation bears a complexity that likely exceeds limited classifications by race.[5] Furthermore, singular considerations of race underestimate the vast cultural heterogeneity within phenotypic groups. Ethnicity groups individuals based on common cultural or national traditions.

Race and ethnicity are defined and categorized by the Office of Management and Budget[6] for standards in federal statistical reporting and are commonly used designations in economic and epidemiologic studies.[3, 7] Disparities have been defined by the Institute of Medicine report[3] as racial and ethnic differences in the quality of healthcare. This definition focuses on differences attributable to the operation of healthcare systems and recognized or unrecognized bias or discrimination.[3] Healthy People 2020 further defined health disparities as differences in health attributable to economic and/or social disadvantage.[8, 9] Inequity reflects differences in disease burden, allocation of resources, and outcomes. Health equity aims to achieve the highest attainable health among all people through fairness in distribution of health resources, determinants, and outcomes.[8, 9]

Racial Disparities in HF Prevalence, Incidence, and Risk Factors

Self-identified African-American or Black patients, and Hispanic patients have disproportionately high prevalence of HF in comparison to other racial groups.[1] In individuals without baseline cardiovascular disease, as included in the Multi-Ethnic Study of Atherosclerosis (MESA), African-American participants had the highest risk of developing HF, followed by Hispanic, White, and Chinese participants (4.6, 3.5, 2.4, and 1.0 per 1000 person-years), respectively.[10] Similar findings were noted over a longer follow up period in the Atherosclerosis Risk in Communities (ARIC) Community Surveillance data, in which African-American men and women had the highest burden of new-onset HF cases and the highest age-adjusted 30-day case fatality rate in comparison to White men and women.[11, 12]

African-American, American Indian, and Hispanic individuals have a higher burden of modifiable risk factors, such as hypertension, obesity, and diabetes that may increase HF risk.[1, 2, 13–15] Structural cardiac changes, including left ventricular hypertrophy (LVH) and asymptomatic left ventricular (LV) systolic and diastolic dysfunction are more prevalent, associated with increased clinical HF and mortality risk, and underrecognized in African-American and Hispanic patients.[16–18] African-American patients are also more likely to have heart failure from non-ischemic causes.[19] Though HF risk increases with age, African-

American and Hispanic patients are more likely than White patients to have a younger age of HF onset.[12, 13] The Coronary Artery Risk Development in Young Adults (CARDIA) study described a striking 20-fold higher incidence of HF in young Black women and men before the age of 50 (cumulative incidence 1.1% and 0.9%, respectively) versus White women and men (0.08% and 0%, respectively) within this cohort.[20] U.S. population projections by the year 2050 forecast increased racial/ethnic diversity with 1 of 3 individuals anticipated to be of Hispanic ethnicity or origin.[2] Understanding HF risk factor burden, the earlier age of incident HF, and growing prevalence in an aging, diverse population is critical for effective interventions to attenuate HF disparities.

Racial disparities in HF Mortality

Premature deaths in young and middle-aged African-American individuals have increased and the HF mortality disparity has worsened over the last 18 years.[21] A recently published assessment of the Centers for Disease Control and Prevention's Wide-Ranging Online Data for Epidemiologic Research (CDC WONDER) between 1999 and 2017 demonstrated a 2.97-fold higher and 2.60-fold higher age-adjusted HF-related cardiovascular (CVD) death rate for African-American women and men age 35 to 64, in comparison to White women and men.[21, 22] Overall, age-adjusted HF-related CVD death rates increased from 1.16 to 1.43-fold in African-American men versus White men, and from 1.35 to 1.54-fold in African-American women versus White women.[21] Thus, age-adjusted HF death rates were highest in African-American men (118.2 per 100,000), followed by non-Hispanic White, American Indian or Alaskan native, Hispanic, and Asian-Pacific Islander men (111.3, 95.0, 69.2, 46.2 per 100,000), respectively.[1] In women, the highest age-adjusted HF death rates were observed in African-American women followed by American Indian women.[1] In spite of higher risk factor profiles, Hispanic patients with HF with preserved ejection fraction (HFpEF) have lower mortality in comparison to non-Hispanic White patients, but similar mortality risk in HF with reduced EF (HFrEF).[14] Comprehensive solutions addressing disparate HF mortality outcomes among racial/ethnic groups are needed.

Racial disparities in HF Hospitalizations

HF hospitalizations (HFH) reflect both acuity of illness and implications for prognosis and mortality. Two or more HF hospitalizations within a year dramatically increases 1-year mortality risk by nearly 30%.[23] Trends from the National Inpatient Sample between 2002 and 2013 demonstrate an overall decrease in HF hospitalizations of 30.8%, attributed to improvements in outpatient pharmacologic and device-based management.[24] Recently released analysis of the Nationwide Readmission Database, however, suggests that HF hospitalizations after 2014 are on the rise.[25] In spite of improvements in overall HF management, age-standardized HF hospitalization rates among African-American men and women have not improved over the last decade and remain two and half-fold higher relative to White men and women.[26] Readmission rates at 30-days[27] and 1-year[28] are also higher in African-American patients relative to White patients.

Trajectories of hospitalization following incident HF diagnosis observed from the Health and Retirement Study have demonstrated significantly higher all-cause hospitalizations in African-American women in comparison to Hispanic and White women.[29] In contrast, the

HF hospitalization disparity gap has narrowed to near similar or improved age-adjusted rates overall for Hispanic and Asian/Pacific Islander patients relative to White patients.[24] In-hospital and immediate post-discharge HF mortality is higher in White patients in comparison to other racial/ethnic groups, possibly related to differences in HF severity at the time of admission.[30–33] Racial/ethnic disparities also exist in acute HF triage, admission, and clinical service decisions.[34] Several studies have observed less likelihood for African-American and Hispanic patients to receive cardiologists-delivered inpatient HF care, and when appropriate, palliative care during HF hospitalizations.[35–38]

Racial/ethnic inequity in Heart failure: GDMT, Exercise, Clinical Trials

1. **GDMT—**The development of efficacious guideline-directed medical therapy (GDMT) for HFrEF collectively remains one of the most impressive and important therapeutic advancements within cardiovascular medicine.[39, 40] A substantial portion of the yearly 300,000 HF-related deaths could be prevented with extensive and consistent implementation of GDMT.[41, 42] Underutilization of effective GDMT has been observed across racial/ethnic groups. Data from the outpatient CHAMP-HF registry (Change the Management of Patients with Heart Failure) demonstrates that one to two-thirds of eligible patients were not prescribed appropriate GDMT as stable outpatients.[43] These findings are similar to underutilization reported in the IMPROVE-HF registry (The Registry to Improve the Use of Evidence-Based Heart Failure Therapies in the Outpatient Setting) ten years prior.[44] Prescribed GDMT in clinical practice is consistently below target dosing achieved in HF clinical trials.

   Individuals of Hispanic ethnicity are less likely to be treated with angiotensin receptor neprilysin inhibitors (ARNI), evidenced-based beta blockers (BB), or mineralocorticoid antagonists (MRA).[43] In spite of data highlighting the significant benefit of combination hydralazine and isosorbide nitrates (H/I) in African-American patients,[41, 45] poor utilization of H/I persists.[46] Recent registry data suggests that only 11% and 18% of eligible African-American patients are taking H/I and ARNI, respectively.[46] African-American patients, however, are more likely to receive BBs and MRAs.[47] Target dosing of BBs and ARNIs is more commonly achieved or approximated in African-American patients, a phenomenon likely related to higher hypertension burden within this population.[43] As newer pharmacologic medications with efficacy in HF emerge, such as sodium glucose cotransporter-2 (SGLT2) inhibitors, equity in access and utilization must be a priority. Adequate prescribing and dose titration of GDMT among all demographic groups remains a systemic challenge in achieving quality HF care.

2. **Cardiac Rehabilitation, Exercise, and Health Status—**Exercise training and cardiac rehabilitation (CR) are safe and effective adjunctive therapies associated with improved quality of life and decreased HF mortality and hospitalizations.[48–50] U.S. and European guidelines provide Class I recommendations for stable HF patients to include exercise training in standard HF management.[39, 51] Though cardiac rehabilitation is generally underutilized in the overall population, racial and ethnic minorities are significantly less likely to receive cardiac rehabilitation referrals.[52] In light of the mortality

and functional benefits, significant attention should be focused on eliminating barriers to referral, enrollment, availability, and completion of CR.[53–55]

Optimization of health status with improved symptoms and quality of life is an important patient-centered focus in HF management. Clinical assessment tools and questionnaires have provided fundamental insights into living with HF. HF-specific health status differs amongst racial/ethnic groups, though reasons for this are incompletely understood. In CHAMP-HF registry data, Hispanic and African-American patients have been shown to have worse HF-specific health status in unadjusted analyses, which persisted with adjustment in Hispanic patients.[56] Adjusted analysis in the Tele-HF (Telemonitoring to Improve Heart Failure Outcomes) trial however, did not demonstrate significant racial/ethnic differences in patient-reported health status at three and six months following hospital discharge.[57]

3. **HF Clinical Trial Representation—**Clinical trials are imperative to understanding the impact of pharmacotherapies and interventions across the population. Among review of 25 notable randomized clinical trials in heart failure, outcomes by race were reported for fewer than half of the trials (48%).[58] In spite of increased HF incidence and hospitalization, African-American participants have been underrepresented in pivotal landmark trials that form foundational quad-therapy for HFrEF management in the modern era, often comprising less than 5.5% of the treatment group.[59–62] American Indian participants are also underrepresented. Enrollment of African-American participants has decreased over time, in spite of overall population increases in clinical trial participation.[63, 64] A recent review of cardiac surgical trials in ClinicalTrials.gov, including advanced HF therapy trials demonstrated that only 42.7% of these trials reported race information and even fewer (29.2%) reported ethnicity.[64] Within this cohort, only 4.0% of trial participants were African-American, whereas Hispanic and Asian participants were 11.2% and 10.4%, respectively.[64]

Clinical trial enrollment of other racial/ethnic minorities remains modest. Local investigator decisions and independent patient perceptions may significantly impact enrollment in clinical trials.[65] This enrollment deficit may contribute to an incomplete reflection of real-world patients with HF in clinical trial populations and is a missed opportunity towards understanding the complexity of therapeutic interventions in a diverse, representative population.[65]

Racial/ethnic inequity in HF devices, procedures, and advanced therapies

1. **ICD and CRT—**Implanted cardioverter defibrillators (ICD) have proven mortality benefits and are guideline-recommended in appropriately selected HF patients.[39] There has historically been a wide and notable racial/ethnic disparity in ICD utilization. Eligible African-American and Hispanic patients are less likely than White patients to receive counseling for or placement of primary prevention ICDs during or following HF hospitalization.[66] However, the ICD racial/ethnic disparity gap is narrowing over time.[67, 68]

In appropriately selected patients, cardiac resynchronization therapy (CRT) restores left ventricular (LV) synchrony, remodels the LV, improves quality of life, and reduces HF hospitalization and mortality.[69–72] However, significant racial/ethnic disparities in CRT

utilization persist, in spite of similar benefit across demographic groups.[73, 74] Registry data has demonstrated that CRT-eligible African American and Hispanic patients are less likely to receive CRT than White patients, even with adjustment for higher HF burden.[75, 76] Racial/ethnic minorities have been underrepresented and underreported in landmark CRT trials. [77]

2. Percutaneous Mitral Valve Interventions—In HFrEF patients with symptomatic, severe secondary mitral regurgitation (MR) on maximally-tolerated guideline-directed medical therapy, transcatheter mitral valve repair (TMVr) reduces hospitalization and mortality risk.[78] TMVr utilization has increased across the population since its introduction. However, recent evaluation of the National Inpatient Sample has demonstrated that the proportion of African-American patients receiving TMVr has not increased over time similar to White patients.[79] African-American patients who did receive this therapy were younger with fewer procedure-related adverse outcomes and had better in-hospital mortality than White patients who were more likely to be older receiving this therapy.[74, 79]

3. Heart Transplantation and Durable Left Ventricular Assist Devices—Heart transplantation (HT) and durable left ventricular assist devices (LVAD) offer improved quality and duration of life for patients with severe symptomatic HF. Advanced heart failure therapies, however, are not equitably allocated.[74] Over the last decade (2008–2018), the proportion of African-American waitlist candidates has modestly decreased (24.8%), and the transplant rate for African-American and Hispanic patients has declined (from 82.0 to 69.2 and from 90.2 to 80 per 100 waitlist-years, respectively).[80] African-American patients who are bridged to transplant with an LVAD have a higher burden of pre- and post-transplant mortality, increased likelihood of delisting, and lower likelihood of transplantation in comparison to White and Hispanic patients.[81, 82] African-American recipients continue to have the lowest 5-year post-transplant survival.[1, 80, 83, 84] Multidisciplinary team care has been associated with more equitable post-transplant survival by race.[85]

Recent review of the Interagency Registry of Mechanically Assisted Circulatory Support (INTERMACS) demonstrated that destination LVAD therapy was more common in White and African-American patients than Hispanic and Asian patients.[86] However, in adjusted analysis of the State Inpatient Databases, African-American and particularly Hispanic patients were less likely to receive LVADs than White patients.[87] LVAD utilization increased between 2012 and 2015 in African-American patients, though utilization remains lower than expected considering HF incidence and prevalence.[86] The precise reasons for the increased implantation rate in African American patients during this period have not been determined.[86, 88] Medicaid expansion under the Affordable Care Act was not associated with increased LVAD implant rates by race or overall.[87, 88] Among heart failure providers, Black patient race has been shown to influence decision making, resulting in less consideration for transplantation and more consideration of LVAD therapy in African-American patients represented in clinical vignettes.[89] The scope of impact of the 2018 transplant allocation policy changes on equity in advanced HF therapies has not been fully elucidated, and warrants high priority investigation.

Future Directions: Innovation and Equity-focused solutions in HF care delivery

Health equity and the actionable attainment of improved health status and outcomes across populations of HF patients must be a primary focus and investment of the cardiovascular community. Integral to this pursuit is understanding the interface of social determinants of health (SDOH) and their impact on HF risk factors, progression, and outcomes. Healthy People 2030 classifies SDOH into five domains including, healthcare access and quality, economic stability, social and community context, education access and quality, and neighborhoods or built environments.[90] Structural, evidenced-based interventions incorporating SDOH are necessary to achieve population-level reductions in racial/ethnic disparities and improve overall HF care and outcomes.

The foundation of health equity interventions (Figure 1) are based on widespread, authentic stakeholder engagement.[91] Multi-disciplinary stakeholders include policy makers, health systems, clinicians, researchers, pharmacists, community advocacy groups, insurers, industry leaders, investors, and patients. Resource investment, high quality structural interventions on SDOH, and robust methods of dissemination and implementation focused on guideline-directed HF care are needed.[91] Equity in HF care will be predicated on adequate and affordable insurance and prescription coverage, flexible, community-based HF screening and intervention programs, early HF risk factor modification, and improved referral, access, and utilization of HF care, including advanced HF therapies.[74] Individualized therapeutic interventions and further insights regarding HF progression may also be aided by conscientious use of personalized and precision medicine tools.

Achieving health equity will require the challenging, but necessary evaluation of and intervention on structural racism and implicit bias within health care delivery. Improved provider-patient and health system-patient relations with culturally-sensitive and language-congruent interactions are foundational to high quality care delivery. Diversification of the physician, advanced practice provider, and investigator workforce is fundamental to meeting the needs of a growing HF population and optimizing care delivery across diverse communities.

Conclusion:

Racial/ethnic inequities in HF burden, access to therapies, and outcomes persist. Notably, the HF mortality disparity in African-American patients has widened and requires urgent attention. Racial/ethnic disparities in HF incidence, hospitalization, clinical trial representation, and CRT utilization persist. Rectifying inadequate GDMT utilization and low enrollment in CR among all patients with HF remains a high-priority. Racial/ethnic disparities in ICD and LVAD utilization have narrowed, though disparities in transplantation rates and outcomes remain. Newer therapies and policies, such as new additions to GDMT, TMVr, and changes to transplant allocation, should be closely followed for impact on equitable patient utilization and access. Innovative, solutions-focused research is paramount to addressing racial/ethnic HF disparities. Evidenced-based interventions, enabled by authentic stakeholder engagement, are the mandate of the present to achieve equity in HF care.

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[PubMed: 31707940] ** This study examined advanced heart failure medical decision making through clinical vignettes and found that Black race influenced decision making regarding LVAD or transplantation. African-American vignette patients were less likely to be offered transplantation than White vignette patients, but were more likely to be offered LVAD therapy.

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Key Points:

- Racial and ethnic disparities in heart failure incidence, hospitalization, and outcomes persist.
- Over the last two decades, disparities in heart failure mortality have worsened among African-American patients and requires urgent attention.
- Guideline-directed pharmacologic therapy and cardiac rehabilitation are generally underutilized, though notable racial/ethnic disparities exist.
- Implantable-cardioverter defibrillators and left ventricular assist devices are increasingly utilized and racial/ethnic disparities have narrowed with these therapies. However, disparities in clinical trial representation, cardiac resynchronization therapy utilization, heart transplantation access, and post-transplant survival persist or worsen.
- Structural interventions considering the social determinants of health are required to achieve health equity and optimization of HF care.

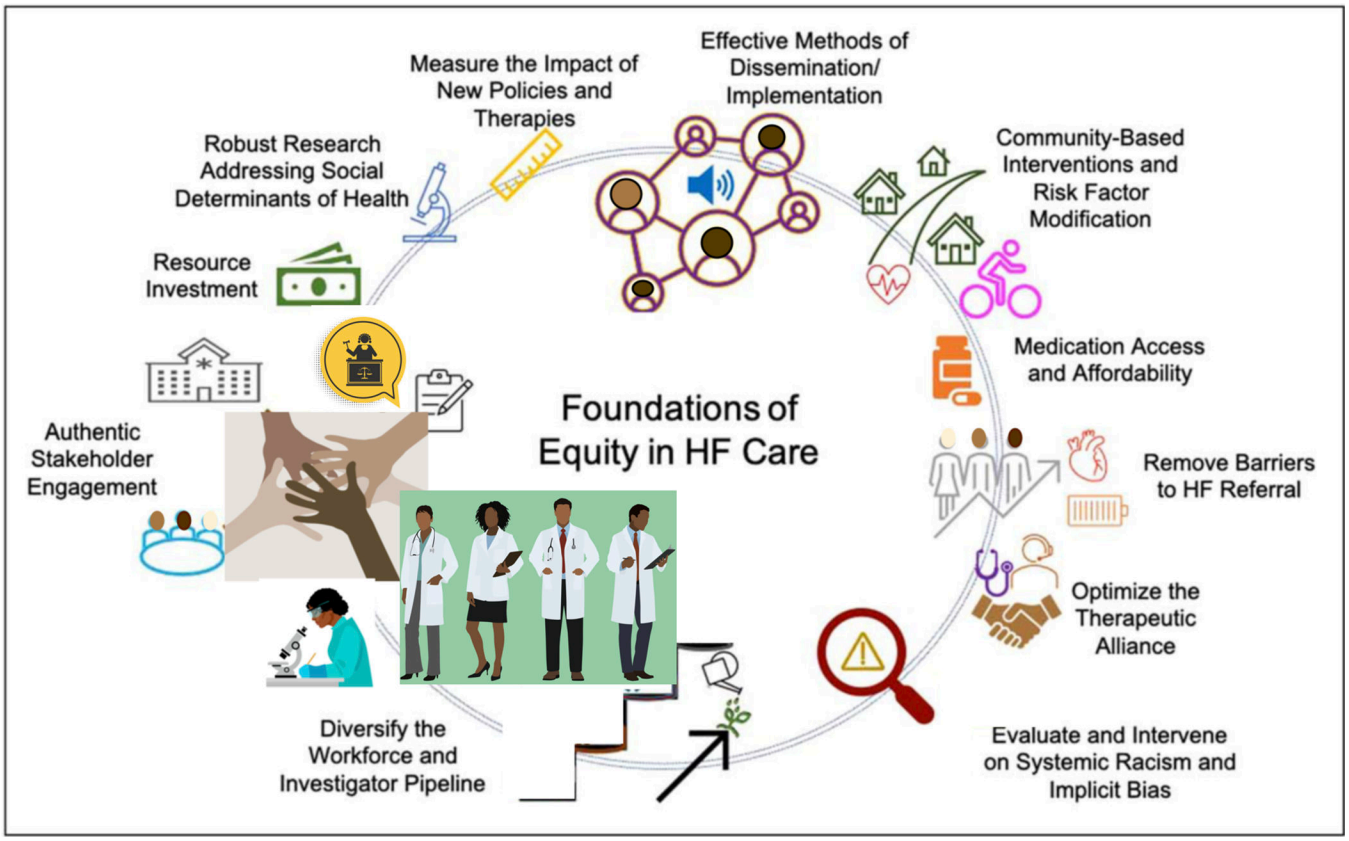

Figure 1:
Foundations of Equity in HF Care