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RACIAL, ETHNIC AND GENDER DISPARITIES IN VALVULAR HEART FAILURE MANAGEMENT

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Abstract

Racial, ethnic, and gender disparities are present in the diagnosis and management of valvular heart disease. Prevalence of valvular heart disease varies by race, ethnicity, and gender, but diagnostic evaluations are not equitable across the groups, which makes true prevalence less clear. The delivery of evidence-based treatments for valvular heart disease is not equitable. This review focuses on the epidemiology of valvular heart diseases associated with heart failure and the related disparities in treatment, with a focus on how to improve delivery of non-pharmacological and pharmacological treatments.

Keywords

Valvular heart disease; Heart failure; Mitral regurgitation; Aortic stenosis; Disparities; Social determinants of health; Women’s Health; Racial Disparities

Introduction

Valvular heart disease (VHD) existing by itself or as a cause or consequence of heart failure (HF) is present in all populations, but disparities in treatments and outcomes exist depending on race, gender and severity and type of valvular disease. Mitral regurgitation (MR), mitral stenosis (MS), aortic stenosis (AS), aortic regurgitation (AR), tricuspid regurgitation (TR), and rarely pulmonary valve disorders are commonly seen VHD in association with HF.

Racial and gender VHD disparities include differences in VHD risk, treatment, and outcomes. Disparities in VHD vary depending on severity and type of valvular heart disease. Black patients have an earlier age of onset, higher prevalence and age-adjusted

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mortality for HF when compared to other populations.[1] Women have worse outcomes from VHD such as mitral valve prolapse (MVP), and pregnant women with left sided valvular disease such as MS and AS experience increased maternal morbidity and adverse fetal outcomes.[2,3] Advances in medications, interventional procedures, or cardiac surgery can improve outcomes for patients with VHD related to HF.

In this review, we will describe the prevalence of VHD associated with HF and disparities in minoritized racial and ethnic groups and women. The purpose is to better understand the mechanisms and etiologies of these disparities. Furthermore, this review proposes strategies to address racial, ethnic, and gender VHD disparities and improve health outcomes. By addressing these disparities and implementing solutions, health outcomes for all patients with VHD associated HF may improve.

Disparities in Mitral Valve Diseases associated with Heart Failure

Epidemiology of Mitral Regurgitation, Mitral Valve Prolapse, and Mitral Stenosis

Mitral regurgitation (MR) is a common valvular disease that can be classified as primary or secondary. MR has an estimated prevalence of ~1.7% which increases to ~9.3% in those >75 years of age.[4] Primary MR is due to a structural abnormality of the mitral valve (MV) usually caused by rheumatic heart disease in under-resourced countries or by degenerative valve disease predominantly mitral valve prolapse (MVP) in the United States.[5] Secondary MR is due to left ventricular dysfunction and/or dilatation with associated electrical/mechanical abnormalities and absence of organic valvular disease and is more common than primary MR. Secondary MR is a predictor of poor clinical outcomes in patients with HF with reduced left ventricular ejection fraction (HFrEF) and associated with a 3-fold risk of HF and a 2-fold risk of death compared to patients without MR.[6,7] The severity of secondary MR is associated with the risk of HF and all-cause mortality.[8] In a retrospective study of patients with dilated cardiomyopathy, 24% of patients had quantitatively assessed severe secondary MR, which was a predictor of death and HF hospitalizations at 2.5 years of follow-up.[8]

MVP and MR impacts patients differentially by sex and by race. MVP is a valvular disease characterized by excessive MV leaflet displacement into the left atrium in systole usually caused by myxomatous degeneration. The prognosis of MVP is usually benign, but serious sequelae can occur most frequently resulting in severe MR.[9] It is more common in women. A large health system in the United Kingdom showed that Black patients had a higher prevalence of secondary MR due to restricted leaflets than White or Asian patients likely due to higher prevalence of nonischemic cardiomyopathy.[10] Black women have more cardiovascular (CV) risk factors and higher risk of HF and death before HF and thus represent a more vulnerable population when concomitant MR or MVP is present.[11]

Mitral stenosis (MS) presentation and treatment vary from MR. MS is usually caused by rheumatic heart disease and is common in under-resourced countries and in US immigrant populations.[5] It is characterized by leaflet thickening (or calcification), nodularity, and commissural fusion, all of which result in MV. Efficacy of medical treatment by drugs for

severe MS is poor and interventional treatment is preferred except in cases of a strong contraindication.

Disparities in Treatments and Outcome of Mitral Regurgitation, Mitral Valve Prolapse and Mitral Stenosis—Gender and racial differences exist regarding MV pathology, operative strategy, and long-term outcomes. Women have a higher prevalence of MV calcification, rheumatic MV disease, and increased leaflet thickening, whicha can be challenging for MV repair.[12,13] Compared to men, women are less likely to undergo MV repair but when they do receive treatment, they have more advanced disease stages and consequently higher operative mortality and reduced long-term survival.[14] Women with MVP are less likely to undergo cardiac valve surgery than men, have higher rates of survival for mild MR, yet experience worse survival rates for severe MR associated with MVP.[13] Women also experience higher risk for morbidity and mortality when undergoing combined valve and bypass surgery. Among patients with MVP and severe MR, women with severe disease have worse survival and lower surgery rates than men.[3,13] Women with MR were more likely to undergo prosthetic MV replacement, have concomitant tricuspid valve surgery and had worse post-operative long term survival.[3] It is unclear how much of these findings are due to late diagnoses or delayed referral. Clinician bias is a known factor contributing to lack of referral or discriminatory decision-making for other CV diseases.[15–17]

Racial differences exist in the prescription of guideline directed medical therapy (GDMT) - which remains first line therapy for secondary MR and HFrEF.[18,19] A national community surveillance of hospitalized HF events in the US demonstrated that optimal GDMT was prescribed in about 10% of patients at hospital discharge.[20] This under prescription of GDMT may disproportionately worsen clinical outcomes of secondary MR in Black patients who have higher rates of nonischemic cardiomyopathy.[10]

Cardiac resynchronization therapy (CRT) is not optimally used across populations. CRT with optimal GDMT is the next therapeutic option for eligible patients with secondary MR and HFrEF and should be performed prior to MV procedural interventions. It is recommended in patients with HFrEF and left bundle branch block, in sinus rhythm with New York Heart Association functional class II to IV symptoms on GDMT with left ventricular ejection fraction ≤35%.[21] CRT reduces leaflet tethering and closing forces on the MV, improves leaflet coaptation thereby restoring synchronous LV contraction, decreases LV size, improves LV systolic function, and reduces secondary MR over 3–6 months of follow up.[6,22] Black patients are less likely than White patients to receive implantable cardioverter defibrillators after adjusting for demographics, clinical characteristics, and socioeconomic factors.[23] An examination of a national registry found that Black and Hispanic patients who were eligible for CRT with defibrillator were less likely to receive therapy compared with White patients.[24] These disparities in CRT utilization have persisted over time with underuse of CRT in Black patients and women.[25] The Affordable Care Act (ACA) was associated with increased CRT access for White but not Black or Hispanic populations.[26]

Data regarding use of transcatheter edge-to-edge mitral valve repair (TMVR) are limited by race. The TMVR MitraClip (Abbott, Illinois, USA) is the most widely adopted device and has been studied in two randomized, controlled trials among patients with HFrEF and secondary MR.[27,28] The racial composition of the participants was not reported in these trials. A propensity score matched outcomes analysis from 2012–2016, showed that only 8.6% of TMVR procedures were performed in Black patients with an unchanged proportion of Black patients over time despite increase in procedural volume.[29] Black patients undergoing TMVR were more likely to be younger and female compared with White patients.[29] White patients had higher in-hospital cardiac arrest and pacemaker insertion and shorter median length of stay when compared with Black patients.[29] Another study showed no gender differences in rates of TMVR and no difference in in-hospital mortality and major complications for TMVR among women compared with men.[30]

MV repair is preferred over MV replacement as the treatment of primary MR but is allocated disparately by race. MV repair is ideal due to lower operative/long-term mortality, improved preservation of LV function, avoidance of anticoagulation, decreased risk of thromboembolic complications, endocarditis, and long term freedom from reoperation.[31] A retrospective analysis found that patients undergoing MV surgery were younger (45.6 ± 14.4 versus 60.5 ± 15.3 years), less likely to undergo MV repair and had higher incidence of comorbidities; whereas White patients (n=1,302, 91.4%) underwent repair more commonly with degenerative MV disease.[32] No differences were found in the incidence of postoperative complications or hospital mortality (2.4% Black race versus 5.1% White race, $p = 0.19$).[32] An administrative database analysis found that Black and Hispanic patients had a more emergent presentation for MV surgery, underwent MV repair less often, were more likely to have MV replacement and had a higher length of stay when compared to White patients.[33] A 10-year analysis of care in the state of Michigan demonstrated higher likelihood of MV repair for White patients than other racial groups (White 66%, Black 53.3%, Other race 57%; $P < .001$) and similar operative mortality across racial groups (White 3.7%, Black 4.6%, Other 4.5%; $P = 0.36$).[34]

MS treatments vary by country wealth. Negative chronotropic agents and diuretics are the mainstay for medical therapy control of heart rate in symptomatic MS. Correction of secondary conditions such as anemia, fever, infection, and volume overload can also be beneficial. Surgical options include closed or open valvotomy and MV replacement. Closed valvotomy is mostly done in under-resourced countries while percutaneous balloon valvuloplasty allows controlled reconstruction of the valves, and simultaneous tricuspid valve repair or MV replacement to be performed if indicated.

Disparities in Aortic Valve Disease

Epidemiology of Aortic Stenosis and Aortic Regurgitation

Aortic stenosis (AS) is a common valvular heart disease and mainly a disease of aging.[35] The most common cause of AS in the US is calcific AV disease, but rheumatic heart disease is often a cause in US immigrant populations, under-resourced countries, and in patients with congenital bicuspid valve. A meta-analysis of older subjects ≥75 years of age in Europe and North America demonstrated a population prevalence of AS of 12.4% and a prevalence

of severe AS of 3.4%.[36] Aortic regurgitation (AR) is the diastolic reversal of blood flow from the aorta into the left ventricle. In the Framingham study, the prevalence of AR was estimated as 4.9% and moderate and severe AR occurred in 0.5% of the study population and AR was observed in 13% of men and 8.5% of women.[37] The incidence and severity of AR increases with age, peaking at 40–60 years.[37] An association exists between AS and cardiac amyloidosis in elderly populations. The prevalence of histologically confirmed cardiac amyloidosis in patients being evaluated/referred for AV procedures ranges from 4%−29%.[38,39] A cross-sectional study found higher rates of heart failure due to the V122I variant hereditary transthyretin amyloid cardiomyopathy in patients of African ancestry.[40] However it remains unknown if V1221 portends a propensity towards earlier or more frequent AS in Black populations.

Black patients may have lower prevalence of AS than White patients.[41,42] Studies have demonstrated a lower prevalence of AS in Black patients and other underrepresented ethnic groups.[43–45] The “aortic stenosis paradox,” is a phenomenon whereby underrepresented racial and ethnic groups have more CV risk factors relative to White patients but have a lower burden of AS.[42–44] However, it is unclear how much of this related to improper diagnoses. A single center study of 272,429 patients with retrospective echocardiographic data observed severe AS in 0.29% of Black and 0.91% of White patients; and Black patients were less likely to present with either degenerative AS or bicuspid AV disease.[41] It remains unclear if this is related to underdiagnosis or less AS in Black patients. The best assessment of valvular disease prevalence would require standardized echocardiogram for all population groups irrespective of symptoms and clinical examination to determine the prevalence of disease.

Disparities in Treatments and Outcomes of Aortic Stenosis

Traditionally, surgical aortic valve replacement (SAVR) which improves symptoms and survival was the mainstay of intervention. Transcatheter aortic-valve replacement (TAVR) has been shown to be effective in patients with low, intermediate, and high risk AS with favorable long-term outcomes.[46–49] TAVR is the preferred option for AS in certain subsets of patients (advanced age, poor LV function or coexisting disorders) at increased risk for operative complications or death.

Black patients are poorly represented both in published series of surgical aortic valve replacement and clinical trials of TAVR. The magnitude of under representation in clinical trials is staggering as only 2.7% in the high-risk pool (19 out of 699) were Black patients in the TAVR PARTNER trial.[49] There is currently no data on the literature on equity in access or utilization of aortic regurgitation interventions or surgery among women and Black and Indigenous People of Color (BIPOC).

Disparities in Structural Cardiology Referrals—Black patients with severe AS are less likely to be referred for structural interventions. A single center study showed that Black patients with severe AS were less likely to be referred to cardiology, more likely to decline an intervention, or be lost to follow-up.[50] For every $10,000 increase in income, the odds of

receiving TAVR increased by 10% (p = 0.05) suggesting that income significantly influenced the odds of receiving TAVR.[50]

Racial and gender disparities in referral for CV treatment may be extrapolated to TAVR. Cardiology referrals and follow-up appointments have been less likely to be made for Hispanic and Black HF patients and patients with lower socioeconomic position compared to White patients and patients with higher socioeconomic position.[51] A national study revealed that Black patients were less likely to receive care by cardiologist than White patients when presenting with primary diagnosis of HF requiring intensive care.[52] Physician racial bias has been identified as a possible contributing factor for unequitable referrals.[52]

Disparities in Treatments and Outcomes of Aortic Stenosis—Racial disparities exist in referral patterns for SAVR. A retrospective single center cohort design of 952 patients (423 white, 376 black, and 153 Hispanic) found that after adjusting for clinical and echocardiographic variables, Black patients were younger, more likely to have Medicaid as payer, had more advanced kidney disease, and less likely to be referred to cardiac surgery for treatment of AV disease when compared to White patients.[53] Overall SAVR rates increased but women and Black patients had lower rates of SAVR and higher mortality than men and White patients in a large cross-sectional cohort study of Medicare fee-for-service beneficiaries between 1999 and 2011.[54]

Hospitalization for AS varies by racial and ethnicity.[55] Hospitalization with AS is less common in Black and Hispanic patients than in White patients.[55] In hospitalized patients with AS, Black race is associated with a lower incidence of both SAVR and TAVR compared with White patients, whereas Hispanic patients have a similar incidence of both.[55,56] Black patients with severe AS may suffer greater morbidity and mortality compared to other racial and ethnic groups.[57]

Underrepresented racial/ethnic groups have lower rates of TAVR, and data are mixed on some of the outcomes. A review of a national registry found underrepresentation of minoritized racial groups among patients undergoing TAVR in the US. Of the 70,221 patients who underwent TAVR, 91.3%, 3.8%, 3.4%, and 1.5% were White, Black, Hispanic and Asian/American Indian/Pacific Islander race respectively.[58] No differences of in-hospital mortality, myocardial infarction, stroke, major bleeding, vascular complications, or new pacemaker requirements were observed, but Black and Hispanic patients had more HF hospitalizations when compared with White patients.[58]

Structural heart interventions were performed less frequently in Black and Hispanic patients compared with White patients in a retrospective national inpatient study of 106,119 weighted hospitalizations for TAVR, TMVR, and left atrial appendage occlusion.[59] Utilization rates were higher in White patients compared with Black and Hispanic patients for TAVR (43.1 versus 18.0 versus 21.1), TMVR (5.0 versus 3.2 versus 3.2) and left atrial appendage occlusion (6.6 versus 2.1 versus 3.5), respectively (P<0.001). No differences in the adjusted in-hospital mortality or key complications between patients of all races following TAVR, TMVR, or left atrial appendage occlusion was observed. Hispanic patients

had modestly higher cost with TMVR and left atrial appendage occlusion when compared with White patients.[59]

Black patients are less frequently referred for cardiac catheterization, percutaneous coronary interventions, and coronary artery bypass graft surgery than White patients.[60,61] These differences cannot be accounted for on the basis of health insurance or socioeconomic status.[62] As the population of VHD candidates and treatment options for valvular diseases expands, ensuring equity in referrals and interventions towards all groups is important to improve outcomes.

Disparities in Tricuspid Valve Disease

Epidemiology of Tricuspid Regurgitation—Tricuspid regurgitation (TR) affects 1.6 million U.S. adults and is increasingly recognized for its increased associated mortality, regardless of pulmonary artery pressures or left ventricular function.[63,64] TR impacts a higher percentage of women than men, and the Framingham study suggested TR of mild or more severity is seen in 14.8% of men and 18.4% of women and is strongly associated with age.[37,65,66] Population cohort estimates of TR have varied.[65,67] Observed mortality associated with TR is closely linked to TR severity and speed of development.[63] Functional TR, marked by tricuspid annular dilation and adverse right ventricular (RV) remodeling, is most commonly observed in the setting of left heart disease, right ventricular dysfunction, and pulmonary hypertension.[65] Primary TR is less common than secondary TR, and is due to intrinsic structural abnormalities in the valve or sub valvular aparatus.[68] It may result from infective endocarditis, with intracardiac device placement, rheumatic heart disease, carcinoid syndrome, or congenital malformations (i.e. Ebstein's anomaly).[69]

Disparities in Tricuspid Valve Interventions—Decisions for intervention for TR should be taken in the context of TR severity, associated RV remodeling, and co-morbid conditions.[70] Isolated tricuspid valve (TV) repair and replacement bears high in-hospital mortality risk (8.8–10.9%), high risk of pacemaker implantation, and significant risk of new dialysis.[71] Thus, most TV surgery is performed concomitant to other cardiac surgery, and few isolated TV surgeries are performed. A retrospective analysis of isolated TV surgery did not show significant sex-based differences in 30-day mortality, five-year survival, or five-year freedom from TV reoperation.[72] Transcatheter tricuspid valve repair (TTVR) is an emerging option for intervention, with and without a concomitant TMVR and are in active trial development and their role in clinical practice is still being defined.[73,74] Rehospitalization for HF is common in the first 30 days post-TTVR, however one-year outcomes suggest reduction in HF hospitalization and death, improvement in New York Heart Association functional class, and improved self-assessed health status in patients with procedural success.[74,75]

Trial inclusion for tricuspid valve intervention varies by sex and patient race and ethnicity. Women have been well-represented in transcatheter tricuspid intervention trials, comprising > 60% of some cohorts given increased prevalence of TR in women, however, little to no trial representation has been reported for BIPOC.[73,75] Effectively, no data regarding equity

of access to or utilization of transcatheter tricuspid interventions in women and BIPOC has been published to date.

Disparities in Pulmonic Valve Disease—Pulmonic stenosis is common in the setting of congenital heart disease.[76] Pulmonary regurgitation (PR) is observed in 5% of structurally normal hearts,[77] but more commonly is seen following surgical or balloon valvuloplasty intervention for RV outflow tract obstruction, particularly in the case of Tetralogy of Fallot.[76] Surgical and transcatheter pulmonic valve replacement are both interventions for pulmonary regurgitation in the appropriately selected patients.

There is no current data on the literature on equity in access or utilization of pulmonary valve interventions among women and BIPOC. Pulmonary valve repair timing has focused on development of RV dilation, HF, and arrhythmias in hopes of circumventing sudden cardiac death. Sex-based differences in volumetric assessments by cardiac MRI may further inform optimal timing for pulmonary valve repair following Tetralogy of Fallot repair. Gaps in transition from the pediatric cardiology to the adult congenital heart disease specialist has been implicated as a factor in losing patients with congenital heart disease with some being lost to follow up.[78]

Strategies for bridging Disparities in Therapies for Treatment of Valvular Heart Diseases in Heart Failure

Women, patients who identify as BIPOC, and individuals with lower socioeconomic position have worse HF outcomes and poorer access to and utilization of valvular interventions. These disparate outcomes warrant focused attention to devise and employ effective solutions to bridge disparities in outcomes and therapeutic utilization in VHD and HF (Table, Figure).

Access to CV providers, interventions, and GDMT is fundamental to receiving appropriate, timely therapy for VHD and HF. Lack of insurance or underinsurance limits attainment of these essentials to care. The primary driver for inadequate insurance is cost of coverage. High out-of-pocket cost contributes to delays in care, and with regards to VHD, delayed presentations portend poor outcomes and limited interventional options. Systemic review of Medicaid expansion under the ACA suggests that insurance coverage increased among those eligible, particularly minoritized racial and ethnic groups.[79] Hispanic patients had a higher probability of receiving all GDMT if they were residents of early adopter rather than non-adopter states of the ACA Medicaid Expansion, irrespective of timing of the ACA.[80] Medicaid expansion has also been associated with increased access to heart transplantation in Black patients.[81] Expansion of coverage may be of particular benefit for younger patients with VHD and HF. Though Medicare has near universal coverage of those over age 65, with fewer than 1% not covered, affordable prescription coverage remains a challenge for many older adults. Affordable health and prescription drug coverage may decrease disparities by improving access to HF services and therapies among minoritized racial and ethnic groups and those experiencing economic hardship.[82]

Risk calculators which predict post-surgical risk and hence decision to offer cardiac surgery can be fraught with bias. The Society of Thoracic Surgeons risk calculator is an online

risk calculator that predicts the risk of adverse outcomes and mortality after cardiac surgery.[83] There should be reconsideraton of the use of race in risk calculators since race is a social construct with no biologic basis. Understanding how social determinants of health and structural racism contribute to outcomes may be more useful. Additionally, bias towards Black patients may lead to less likelihood of recommending cardiac surgery hence perpetuating inequity.

Incorporation of quality metrics surrounding indicated valvular interventions and standardization of valve referral consideration, as has been proposed with other HF therapies, may also bridge disparity gaps.[84] As there may be limited numbers and geographic clustering of HF cardiologists, echocardiographers, and structural interventionalists, consideration should be given to novel care delivery models that leverage telemedicine and outreach clinics in which patients can remain local and still receive streamlined specialty CV care. Central to this consideration are mechanisms to increase community-based screening of VHD for patients with indications by history, symptoms, and exam with increased awareness of the populations at highest risk.

Diverse clinical trial representation is an imperative for valvular intervention trials. Utilization of evidenced-based, life-saving valve interventions have too often followed a path of diminished and delayed access to diverse and under-resourced communities. Black patients are decreasingly represented in HF therapeutic trials.[85] Women have historically been under-represented in HF clinical trials.[86,87] Policies supporting community-based trial design and enrollment and mandating transparency in the demographics of enrollees are needed. Making clinical trials more inclusive requires diversification of clinical trialist, their ancillary teams, and trial leadership with individuals who can authentically engage diverse communities.[88] Diverse trial leadership should be nurtured and trained in cultural competency and effective messaging to build trust with diverse communities.[89,90] Equitable representation of diverse communities must be demanded by the CV community, in pursuit of the best possible outcomes for all patients.[91]

VHD and HF therapies are particularly vulnerable to “gate-keeper effects.” That is, the interfacing clinical provider can advance or delay a patient’s ability to access critical, guideline-directed therapies. This has been seen in referral practices for advanced HF therapeutics broadly.[92] Surgical or transcatheter valve repair or replacement candidacy is thus largely contingent upon provider referral. Bias has been observed in physician decision making regarding advanced HF candidacy, such studies have not commenced for VHD interventions.[93] The patient-physician partnership and communication may be influenced by several social factors.[94] Some studies suggest that race discordant dyads may be perceived as more difficult by providers.[95] Ethnic concordance in other studies has been shown to ease interaction and improve knowledge retention, even in patients reporting lower literacy.[96] Patient-physician communications may be of poor quality when clinicians hold unconscious bias, are unable to execute a shared-decision making skillset, or are lacking cultural competence.[97] Patients are particularly vulnerable to these poor-quality encounters when then have limited English proficiency, low health literacy, and are members of racial/ethnic minority groups.[97] Strategic interventions to address implicit bias among providers, shared-decision making, and cultural competency are imperative to improve patient-physician

communication and deconstruct barriers to appropriate and timely referral for VHD and HF interventions. Ensuring seamless transition of adolescent and young patients with congenital heart disease from the pediatric cardiologist to the adult congenital heart disease cardiologist for can improve health-related knowledge, self-management and reduce need for urgent valvular interventions.[98]

Cultural competency training must include education regarding the social and structural determinants of health (SDOH) and their impact on VHD and HF burden and outcomes. The SDOH are defined as the nonmedical factors that impact health and involve neighborhoods and housing, economic stability, health care access and delivery, education, and social context.[99] Fundamental to understanding the role of SDOH is recognizing structural racism and its primary contribution to adverse HF and VHD outcomes in BIPOC.[100] Equity-focused interventions must take a primary role in remodeling HF outcomes in diverse communities.[101]

Conclusion

Disparities in the prevalence and treatment of HF and VHD persist for Black, Hispanic, American Indian and women patients. Black patients experience the highest burden of HF. Women experience heightened burdens of VHD. A variety of factors contribute to the higher burden of HF and VHD in minoritized racial and ethnic groups and women that must be addressed by facing systemic racism and bias. Approaches necessary to reduce health disparities in HF and VHD should include considerations for universal health coverage, increased access to subspecialists care and screening, increased diverse trial participation, and anti-racist evaluation of institutional policies.

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Key Points:

- Valvular heart diseases are common as a cause or consequence of heart failure
- Racial, ethnic and gender disparities are present in medical and procedural management of valvular heart diseases
- Implementation of strategies may reduce racial, ethnic, and gender disparities. Strategies should include universal health coverage, expanded access to subspecialist care, routine screening, increased enrollment in clinical trials, anti-racist evaluation of institutional policies, and enhanced physician-patient relationship

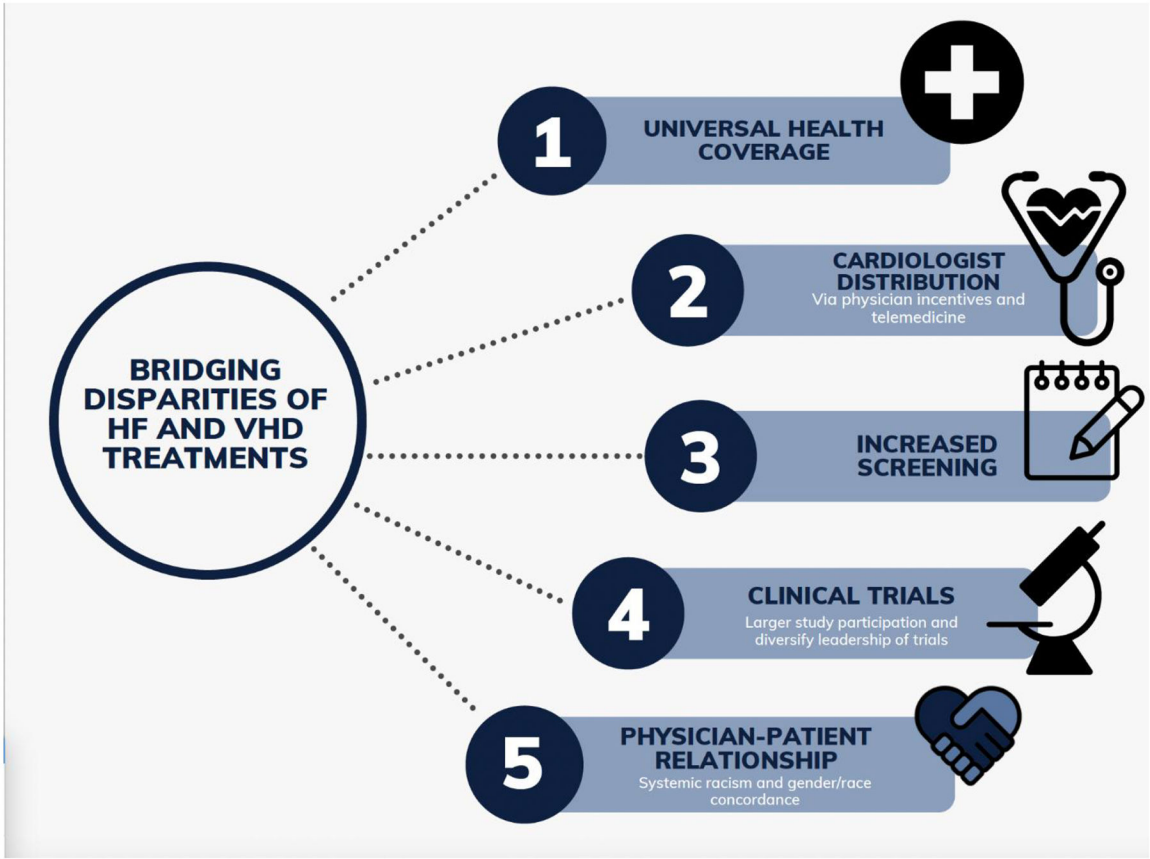

Figure.
Bridging Disparities of HF and VHD Treatments

Table.

Disparities and Strategies in Selected Valvular Heart Diseases Associated with Heart Failure

Therapeutics for Valvular Heart Disease associated with Heart Failure	Disparities in Women and BIPOC	Strategies to Address Disparities
Mitral Regurgitation • GDMT • Cardiac Resynchronization Therapy (CRT) • TMVR • MVR	• Inadequate GDMT prescription • Lower CRT implants • Lower TMVR procedures • Less MVR & worse MVR outcomes in women	• Address uninsurance through universal health coverage • Address poor distribution of cardiologists through physician incentives and telemedicine • Automated valvular disease screening and structural cardiology referral • Larger BIPOC participation in trials and diversifying leadership of clinical trials • Addressing policies that contribute to systemic racism and bias and worsen SDOH. Providing gender/race concordant clinician-patient relationships for mistreated populations • Transition to Adult Congenital heart disease specialists
Mitral Stenosis • Balloon valvuloplasty • Heart rate control	• Under resourced communities and immigrants • Untreated rheumatic heart disease	
Aortic Stenosis • TAVR • SAVR	• Underdiagnosis • Disparities in Structural Cardiology Referrals • Underrepresentation in clinical trials • Underutilization of TAVR and SAVR	
Tricuspid Regurgitation • GDMT • TTVR	• Paucity of randomized trials	
Pulmonary Regurgitation/Stenosis in CHD • Pulmonary valve repair	• Underdiagnosis • Delay in transition from pediatric cardiologist to ACHD cardiologist	

GDMT, Guideline directed medical therapy; CRT, Cardiac resynchronization therapy; TMVR, Transcatheter mitral valve repair; MVR, Mitral valve repair; TAVR, Transcatheter aortic valve replacement; SAVR, Surgical aortic valve replacement; MVR, Mitral valve repair, BIPOC, Black and indigenous people of color; TTVR, Transcatheter tricuspid valve repair; SDOH, social determinants of health; ACHD, Adult congenital heart disease; CHD, Congenital heart disease