

Heart Centers for Women

Historical Perspective on Formation and Future Strategies to Reduce Cardiovascular Disease

ABSTRACT: Heart Centers for Women (HCW) developed as a response to the need for improved outcomes for women with cardiovascular disease (CVD). From 1984 until 2012, more women died of CVD every single year in comparison with men. Initially, there was limited awareness and sex-specific research regarding mortality or outcomes in women. HCW played an active role in addressing these disparities, provided focused care for women, and contributed to improvements in these gaps. In 2014 and 2015, death from CVD in women had declined below the level of death from CVD in comparison with men. Even though awareness of CVD in women has increased among the public and healthcare providers and both sex- and gender-specific research is currently required in all research trials, not all women have benefitted equally in mortality reduction. New strategies for HCW need to be developed to address these disparities and expand the current HCW model. The HCW care team needs to direct academic curricula on sex- and gender-specific research and care; expand to include other healthcare professionals and other subspecialties; provide new care models; address diversity; and include more male providers.

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The decline in cardiovascular disease (CVD) mortality beginning in 1979 was initially seen in men but was not observed in women until after 2000. In 2012, the decline in CVD deaths between the sexes finally became comparable coinciding with over a decade of massive and collaborative efforts geared toward awareness, education, advocacy, research, and implementation of guidelines specific to women.¹ Private practice groups and academic institutions created focused CVD care delivery models for women including Heart Centers for Women (HCW) in response to the increasing attention on CVD in women. Guideline-directed, evidence-based, and sex-specific evaluations, diagnostic testing, lifestyle management, and treatment recommendations have led to improved outcomes in women.² For the first time since 1984, CVD mortality rates were slightly lower in women than in men in 2013.¹ It is regrettable that mortality rates from CVD rose in both sexes in 2014 and 2015 in comparison with 2013 with mortality rates in women remaining slightly lower than in men.¹ Although great strides have been made regarding CVD mortality in women, not all women are benefitting equally from CVD-related mortality reduction, and CVD remains the number 1 cause of death in women in the United States.¹ The objectives of this article are to: (1) review important advances in awareness, sex- and gender-specific research and outcomes, and evaluation and treatment of CVD in women; (2) highlight the historical perspectives and contributions of HCW; and (3) provide future strategies for HCW to expand the care team, include academic education, and address the disparities in outcomes that still exist for women, especially those in underrepresented minority or economically disadvantaged groups.

HISTORICAL PERSPECTIVES ON SEX-SPECIFIC RESEARCH ON CVD IN WOMEN

Inclusion of women in large clinical trials such as CASS (Coronary Artery Surgery Study)³ and SAVE (Survival and Ventricular Enlargement)⁴ resulted in the recognition that deaths attributable to CVD were higher for women than for men, although occurring, on average, 10 years later in women. Trials with an upper age limit of 65 years could not enroll significant numbers of women, and even when enrolling women up to 75 years of age, the percentage of women enrolled in trials remained low.⁵ Improved outcomes with evidence-based treatments continued to expand for men, whereas clinical trials continued to lack adequate numbers of women to gain insight into sex-related differences in outcomes. However, studies did reveal consistently less aggressive treatments being offered for women in comparison with men. Data from the CASS

trial showed that coronary angiography in women was less often associated with significant obstructive coronary artery disease than in men, leading to the erroneous hypothesis that chest pain in women was more likely to be noncardiac in origin.⁶ This resulted in a diagnostic paralysis regarding the evaluation of chest pain in women. The CASS trial also showed significant differences in early outcomes for men and women undergoing coronary artery bypass surgery with women having an operative mortality of 4.5% in comparison with 1.9% in men.⁷ The CASS investigators found that long-term survival rates in patients without perioperative mortality were similar in men and women.⁸ Multivariate analysis suggested that this early perioperative survival difference was accounted for by the difference in body size and the diameter of coronary vessels rather than the sex of the patient.

Early recognition that women were significantly less likely to receive guideline-indicated treatment for coronary artery disease^{9,10} and Dr Bernadine Healy's seminal editorial, "The Yentl Syndrome," served as a call-to-action to increase knowledge regarding heart disease in women.¹¹ Figure 1 is a timeline of important CVD awareness and research advances in women commencing in 1991 with the Yentl Syndrome publication. Dr Healy, the first female director of National Institutes of Health (NIH), established the Women's Health Initiative to address various chronic diseases that affect women. One of the goals of the Women's Health Initiative was to evaluate sex differences that influence pathophysiologic features, treatment, and diagnosis of CVD.¹²

Continued concerns about sex disparity in research prompted 2 federal mandates in 1993. The first was the NIH requirement that all NIH-funded clinical trials include female subjects and be adequately powered to perform sex-specific analysis.¹³ The second was the Food and Drug Administration requirement that all data analysis be sex specific in pharmaceutical trials.¹⁴ With improving public and physician recognition of CVD in women, combined with these federal directives, female enrollment in research trials increased considerably with only 18% in 1970 in comparison with 34% in 2006, but remained suboptimal considering women constitute half the population.¹⁵ The Institute of Medicine report from 2010 highlighted the substantial progress in sex-based research in CVD, but recommended continued efforts to include more women in clinical trials.¹⁶ Despite these federal directives, many current clinical trials still lack sufficient numbers of women to perform appropriately powered sex-specific analysis and continue to have inequitable enrollment of women.^{17,18} Of 156 clinical trials used to support the 2007 recommendations for CVD prevention in women, sex-specific results were reported in only 30% of primary trial publications.¹⁹ Sex-specific refers to genetic and reproductive differences, and gender-specific refers to differences in

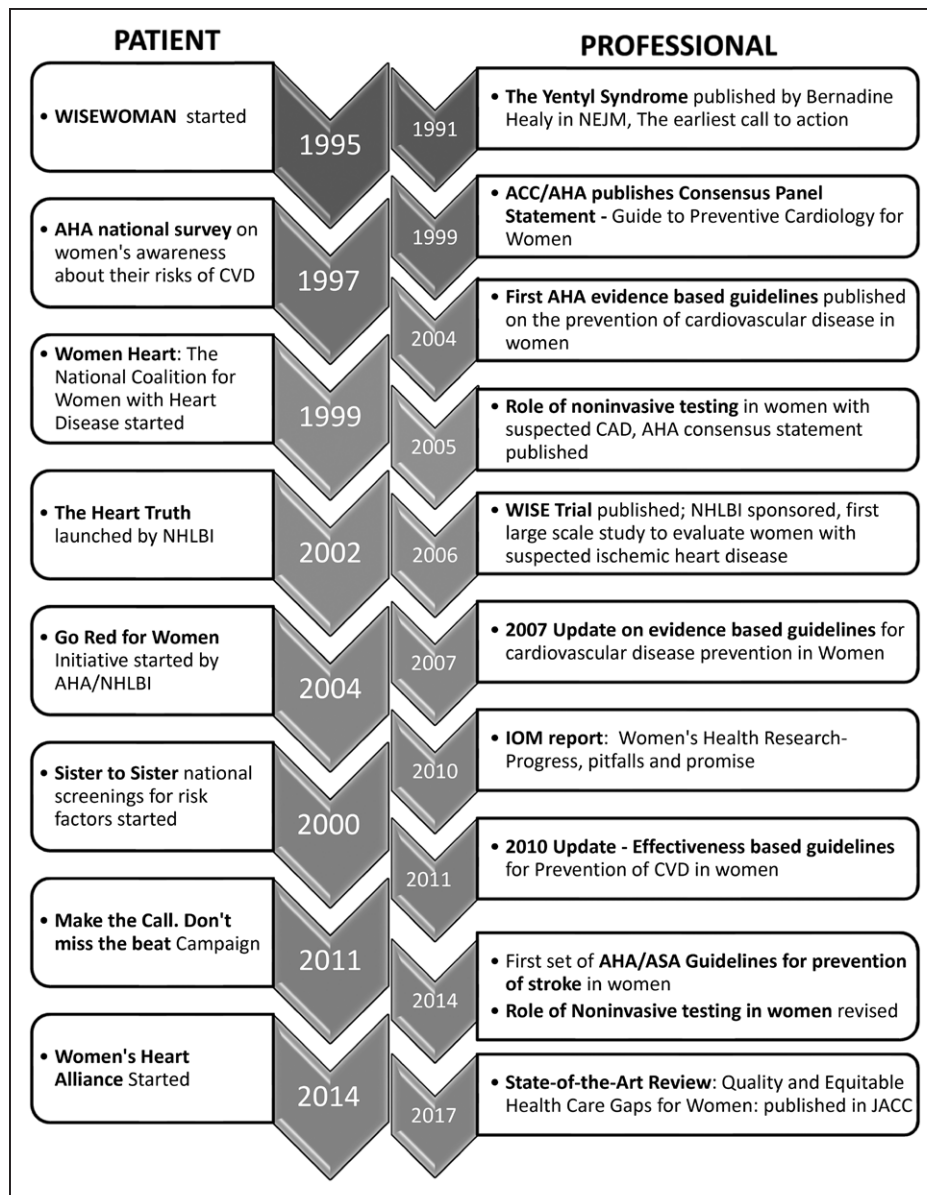


Figure 1. Important advances in increasing awareness and research regarding cardiovascular disease in women.

Left, Patient-targeted campaigns. **Right,** Healthcare professional-targeted research publications and significant initiatives. ACC indicates American College of Cardiology; AHA, American Heart Association; ASA, American Stroke Association; CAD, coronary artery disease; CVD, cardiovascular disease; IOM, Institute of Medicine; JACC, Journal of the American College of Cardiology; NEJM, New England Journal of Medicine; NHLBI, National Heart Lung and Blood Institute; and WISE, Women's Ischemic Syndrome Evaluation.

social roles based on the sex of the person or personal identification of one's own gender.²⁰ Proper evaluation of CVD in women should include both. Currently, the NIH and Food and Drug Administration recommend including minorities, elderly women, and even pregnant women in clinical trials.²¹

Contemporary CVD guidelines for the management of cardiovascular issues such as stable angina, heart failure, and valvular heart disease are similar for men and women. Recommendations may erroneously be assumed to have similar efficacies in men and women, when, in reality, response rates may be very different for the same treatment or drug. For example, aspirin

offered a 32% reduction in risk of myocardial infarction (MI) in men for primary prevention but had no significant benefit to reduce MI in women.²² Sex-specific differences in response to medical devices may also exist. Cardiac resynchronization therapy devices are twice as efficacious in women as in men in improving left ventricular ejection fraction.²³ Women also have more favorable outcomes than men with transcatheter in comparison with surgical aortic valve replacement.²⁴ Frequent symptoms of angina in women with evidence of myocardial ischemia without obstructive coronary heart disease (CHD) were associated with microvascular disease and endothelial dysfunction as measured

by coronary reactivity testing.²⁵ Multiple studies have shown that coronary microvascular and endothelial dysfunction with nonobstructive coronary disease is more prevalent in women, associated with increased use of healthcare resources, a higher symptom burden, and a 2-fold higher mortality.^{26–28} Sex-specific trials to assess the efficacy of pharmacological, mechanical, and surgical interventions and all aspects of cardiac management in women are warranted.

Despite the national spotlight on heart disease in women, significant gaps persist in sex-specific research and many questions of clinical importance remain unanswered. Sex-specific differences in clinical presentation, diagnostic workup, disease pathophysiology, response to treatments, outcomes, and adherence to guidelines between men and women need further elucidation through clinical research. Future efforts including oversampling strategies for the enrollment of women, and increased enforcement by federal, industrial, and professional regulatory bodies of the current federal mandates, as well, may address sex disparity in research and outcomes for women. Continuing medical education programs and academic curriculum, in addition to journals' editors requiring sex-specific reporting of the data are warranted to address these gaps.

PUBLIC AWARENESS OF CVD IN WOMEN

The NIH Red Dress and American Heart Association (AHA) Go Red for Women campaigns to increase awareness of heart disease in women coincided with the AHA release of the first-ever evidence-based guidelines focused on prevention of heart disease in women in 2004.²⁹ The AHA Go Red for Women campaign has expanded to encompass development of risk assessment tools, disease management guidelines, implementation of these guidelines, and sex-specific research to decrease the high morbidity and mortality of CVD in women. Figure 1 is a timeline of landmark initiatives and advances in the public awareness of heart disease in women. Awareness of heart disease as a leading cause of death among US women has almost doubled at 54% in 2012² in comparison with 30% in 1997,³⁰ but it remains suboptimal. Unfortunately, awareness rates are even lower among younger women, ethnic minorities, and women with lower education and income levels.³¹ Most women still do not recognize that diabetes mellitus, pregnancy complications, and early menopause are major risk factors for heart disease in women. Even though the awareness of atypical signs of a heart attack presentation has risen, with 18% in 2012² up from 10% in 1997,³⁰ because of national awareness initiatives, the overall recognition remains unacceptably low. Even when women correctly recog-

nized the symptoms of heart disease, not all women reported they would seek medical attention if they had symptoms. The AHA Go Red for Women and "Make the Call. Don't Miss the Beat" initiatives were successful in increasing the percentage of women who reported willingness to call 9-1-1 if they experienced signs of a heart attack, with improvement from 54% in 2009³² to 65% in 2012.²

The 2014 Women's Heart Alliance survey showed that over two-thirds of women never discussed heart health with their physicians despite having risk factors for heart disease.³¹ The underlying reasons for the misperception of CVD risk, suboptimal prioritization of cardiovascular (CV) health, and avoiding medical care is poorly understood. Women reported factors that influenced these behaviors included prioritizing others over self, caretaker responsibilities, tendency to minimize personal health concerns to avoid placing burden on others, inadequate financial resources, and lack of personal confidence to make a lifestyle change.³¹ Social stigma, in particular, about body weight, also posed significant barriers to seeking adequate medical care, and nearly half the women surveyed canceled or postponed healthcare visits because of weight issues.³¹

Patients' perception of discussions with their healthcare providers regarding heart disease issues have fluctuated over time. In 2003, <40% of women reported discussing heart disease with their doctor, and, after the AHA Go Red for Women Initiative, this number rose to 54% in 2005.³⁰ It is alarming that the percentage of women reporting discussions with their providers about heart disease risks has markedly declined, from 48% in 2009³² to 21% in 2012.² These rates are even lower among Hispanic women than among white or black women.³¹ In a study of young female patients hospitalized with acute MI, ≈50% perceived themselves to be at low risk for heart disease despite having numerous risk factors.³³ Furthermore, in those patients with acute MI and no previous history of coronary artery disease, women were 20% less likely to report prior discussions with their healthcare providers about modification of CVD risk factors than men who were hospitalized with acute MI.³³

PHYSICIAN AWARENESS OF CVD IN WOMEN

In 2004, a national online survey of physicians demonstrated that <1 in 5 physicians were aware that more women died each year of CVD than men.³⁴ A decade later, the 2014 Women's Heart Alliance survey queried 200 primary care providers (PCPs) and 100 cardiologists to determine their self-reported preparedness to address CVD risks in their female patients.³¹ PCPs reported CVD as a top health concern in women, but less important

than weight-related health concerns and breast health. Most physicians reported suboptimal training in assessing CVD risks in women (22% PCPs and 42% cardiologists).³¹ A single-center survey of 80 postgraduate trainees demonstrated that, although 60% recognized the importance and need for implementation of gender-based concepts in their formal curriculum, nearly 70% of respondents reported no or only minimal formal training regarding sex- and gender-specific medicine concepts in their education programs or didactic lectures.³⁵

Physicians' perception of lower CVD risks in women than in men has been associated with underutilization of preventive therapies and guidelines in women in comparison with men.^{34,36} In 2004, an online survey of 300 PCPs, 100 obstetricians/gynecologists (Ob/Gyns), and 100 cardiologists examined knowledge and incorporation of national CVD prevention guidelines.³⁴ Cardiologists and PCPs had a high level of awareness (>90% for both) of contemporary hypertension and lipid guidelines, but a lower awareness of the AHA's CVD prevention guidelines for women (80% and 60%, respectively).³⁴ Ob/Gyns reported 60% awareness of hypertension guidelines, 45% awareness of lipid guidelines, and 60% awareness of CVD prevention guidelines for women.³⁴ Incorporation of CVD prevention guidelines for women was <42% in all 3 groups of physicians.³⁴

The Women's Heart Alliance survey demonstrated similar results with only 16% of PCPs and 22% of cardiologists reporting implementation of the AHA's guidelines for CVD risk assessment in women.³¹ The low rate of guideline-directed care, in particular, among PCPs, is concerning, because this is the group of physicians most likely to provide care for women. Only 1 in 4 PCPs and 1 in 5 cardiologists reported implementing even 5 of the 8 recommended CVD risk assessments in women.³¹ Physician utilization of the American College of Cardiologists/AHA Atherosclerotic Cardiovascular Disease pooled cohort equation risk estimator is better (44% PCPs and 53% cardiologists).³¹ Despite medical society-endorsed guidelines for CVD prevention, disappointing gaps remain in physicians' self-perception of preparedness to assess CVD risks and in the application of guidelines in clinical practice.³¹

HISTORICAL PERSPECTIVES AND CONTRIBUTIONS OF HCW

Appreciation for CVD in women by the public, healthcare providers, researchers, and regulatory bodies increased in response to the professional society and patient advocacy efforts highlighted in Figure 1. Healthcare organizations and physicians developed focused CV care delivery models to study, prevent, and treat heart disease in women. Some models included HCW dedicated to increasing awareness, improving

education for women and their healthcare providers, expanding research, and reducing social barriers to CV care for women. HCW created collaboration among the many healthcare disciplines that provide care for women and crossed barriers from grassroots advocacy to government research and clinical expertise.³⁷

WomenHeart, a patient advocacy organization based in Washington, DC, created a National Directory of Women's Heart Centers in 2001 that initially listed 11 centers; 2 years later, the directory included 29 listings.³⁸ Most of the initially listed programs were located in private practice groups, whereas only 4 were based in academic centers. The gap had widened by 2003, with the number of private group HCW tripling, whereas the number of those based in academic centers doubled. Private practice cardiology groups, often smaller and more nimble than academic centers, saw these innovative programs as a way to increase awareness in the community, create successful business models, and invest within existing structures.

Today, the majority of large and many moderate-size cities have dedicated programs for CVD in women. To date, there is no single agency or organization that accredits or catalogues these programs. Some of the leading programs for research and treatment are in academic institutions that have received grants from the AHA, NIH, Centers for Disease Control and Prevention, and private funding agencies. HCW are an integral part of most large healthcare centers and most academic cardiology programs and are easily found through internet search engines.

Development of centers devoted to the care of women with CVD can facilitate the design and implementation of large-scale studies, which are greatly needed to better and more fully define the unique features of CVD in women at the molecular, cellular, biological, and population levels. Many HCW currently maintain high-quality clinical patient databases. These databases streamline the process of identifying appropriate patients and encourage the design of multisite studies that are essential to ensure socioeconomic, demographic, and geographic diversity.³⁹ Large-scale collaborative studies yield important data in women with CVD as demonstrated by the International Registry of Pregnancy and Cardiovascular Disease.⁴⁰

HCW serve as a point of focus for the development of education and research programs to better address the unique features of CVD in women. The list of ideal key elements of HCW are found in Table 1. The multidisciplinary approach to the care of women with or at risk for CVD has emphasized the importance of developing key clinical benchmarks to allow for standardization of care pathways. Stakeholders in the HCW team include representatives from internal medicine, family medicine, obstetrics and gynecology departments, and nursing programs. Academic centers bear the responsibility

Table 1. Suggested Ideal Elements for a Heart Center for Women

Ideal Elements for a Heart Center for Women
Accessible for all women regardless of geography, income, insurance, or time constraints
Ethnically, racially, and gender diverse multilingual healthcare teams committed to the mission of the Center
Current, culturally appropriate and multilingual patient education materials
Personalized integrated care model utilizing existing guidelines or best practices when available
Multidisciplinary and integrated medical team approach (example: pregnancy and cardiovascular disease, cardiocognitive care, psychological support, nutrition, and exercise support)
Specialized patient intake forms with sex- and gender-specific detailed historical and screening questions pertinent to cardiovascular disease in women (reproductive history, migraines, rheumatologic disorders) that include exercise, nutrition, lifestyle, sleep, stress, and cognitive information
Clinical database to track patient demographics, and patient volume, breadth of referral diagnosis, referral patterns and growth of the program, as well
Clinical database to track diagnoses with outcomes of lifestyle, behavior, and medical therapies
Addresses special needs of women throughout the lifespan from young adults to geriatric care, especially for women with genetic disorders such as adult congenital heart disease and familial hypercholesterolemia
Care models that address gender roles of women and social determinants of cardiovascular disease for women
Expertise in diseases unique to women or seen more often in women, such as spontaneous coronary artery dissection, Takotsubo cardiomyopathy, fibromuscular dysplasia, and coronary microvascular dysfunction

for training medical, nursing, and other health science students, and residents and fellows, as well, who will eventually go on to share this training with others. Although there is currently no subspecialty Accreditation Council for Graduate Medical Education accreditation process, several high-volume HCW offer clinical and research fellowships in women's CVD. These programs provide an intensive involvement with higher volumes of cases of women with or at risk for CVD. They also provide experience with a higher volume of cases in diseases in women such as spontaneous coronary artery dissection, Takotsubo cardiomyopathy, fibromuscular dysplasia, familial hypercholesterolemia, and coronary microvascular dysfunction. This focused approach to the care of women allows the trainees to develop clinical competencies in areas in which there are still few, if any, sex-specific guidelines and best practices. Academic centers with HCW need to be leaders in clinical care and research, and in education of medical students, fellows, practicing physicians, and nurses, as well, to raise awareness of CVD in women and ultimately outcomes.

Diversity education in health care is an important and emerging issue, but it has mostly been centered on ethnic and minority issues rather than sex and gender issues. The Association of American Medical Colleges has diversity learning programs that focus on the professional development of minorities in medicine, but to date there has been no major professional develop-

ment to address sex and gender differences in the care of patients. Some medical schools have recently developed both sex- and gender-specific curricula, although widespread implementation is still needed. In addition, much of the diversity instruction to date has been on educating medical and nursing students and residents. Training needs to be expanded to include practicing physicians, nurses, and advanced practice providers with ongoing continuing education about sex- and gender-based differences in care, assessment of CV risk, treatment, and outcomes.

An ideal HCW care model should incorporate a team-based approach with cardiologists and advanced practice providers with additional resources to provide nutrition, physical activity, cognitive, behavioral, rehabilitative, complementary, and integrative medical, interventional, and surgical resources.³⁷ Some HCW partner with unique disease organizations such as The FH Foundation, The Lipoprotein(a) Foundation, SCAD Alliance, and other research organizations to create focused disease-based registries and pursue research opportunities. All members of the HCW team should be encouraged to adopt and integrate into clinical practice an approach that includes cultural and social issues, and culturally tailored health beliefs, as well, to ensure CV health equity. By customizing healthcare services to a woman's literacy level, culture, and language preference, the team can improve positive health outcomes for a diverse population of at-risk women.^{41,42}

Subspecialty clinics allow clinicians who are appropriately trained and versed in a unique clinical area to treat challenging conditions. Within HCW, these subspecialty areas may include cardio-oncology, rheumatology-cardiology, and genetic disorders in women. Cardio-oncology has become so important in women that the AHA has a scientific statement on CVD in women after breast cancer treatment.⁴³ A rapidly growing HCW subspecialty is heart disease and pregnancy. Women are having children at older ages and subsequently have more comorbidities for or known CVD during pregnancy. This is especially important because the number of pregnancy-related deaths in the United States more than doubled between 1987 and 2013, spiking from 7.2 per 100 000 to 17.3 per 100 000.^{44,45} The leading cause of pregnancy-related death in the United States from 2011 to 2013 was CVD, accounting for 15.5% of such deaths in 2013.^{44,45} In addition, advances in pediatric CV care have yielded more adult patients with congenital heart disease with complex anatomy and physiology who need pregnancy counseling, appropriate care, and follow-up. Some HCW have developed a multidisciplinary pregnancy and CVD service that includes fertility and maternal fetal medicine specialists, obstetric anesthesia, general cardiology, adult congenital heart disease, and specialized nursing teams.⁴⁶ In addition, many HCW programs have moved

to integrated cardiology consultation within the Ob/Gyn clinic space, because many women continue to see an Ob/Gyn as their PCP well beyond the child-bearing years. The AHA and American College of Obstetrics and Gynecology released a joint Presidential Advisory calling for improved collaboration between cardiology and Ob/Gyn to promote CVD risk identification and reduction during well-woman visits.⁴⁷

Women with heart disease are especially at high risk for cognitive impairment and dementia.⁴⁸ One academic HCW practice has added cognitive/brain health integration with heart disease evaluation and treatment. This clinic uses a new model for risk management and prevention of cognitive changes and decline that can occur in persons with heart disease. Midlife hypertension, obesity, and diabetes mellitus provide evidence that even subclinical vascular disease may play an important role in brain aging and cognitive impairment.⁴⁹ Recent studies have suggested that treatment of chronic medical disease and modification of lifestyle factors associated with cognitive decline could lead to a reduction in the incidence of dementia,⁵⁰ with 1 study projecting that up to half of all Alzheimer disease cases worldwide may be attributable to 7 potentially modifiable risk factors.⁵¹ A diverse team of practitioners works together with the cognitive neurologist, using preventive measures to lower modifiable Alzheimer disease risk factors, in addition to applying cognitive screening and therapies to reduce risk factors associated with heart disease, stroke, cognitive decline, and dementia including Alzheimer dementia.⁵²

Awareness of heart disease in women is a critical societal issue that affects half the population, not a gender-based issue. Specialized CV care for women is not limited to female physicians and providers. From the earliest beginnings of the CVD in women initiatives, male physicians and researchers have made major contributions to sex- and gender-specific research, to the construction of clinical guidelines, and to public advocacy. And yet, many of the discussions regarding women and CVD come from women, limiting the lens through which women's CVD health is seen. This is especially important given that women currently represent a minority of cardiologists in the United States with women representing only 21% of all fellows-in-training and 13.2% of all practicing cardiologists.⁵³ Most HCW, advocacy groups, and even national organizations, including AHA's Go Red for Women Program and the American College of Cardiologists Council for CVD in Women, are primarily staffed, organized, and attended by women. Given the public health importance attached to these issues with CVD being the leading cause of death and disability for both American men and women, all physicians need to engage in these programs to truly promote awareness of CVD and improve patient care for all their patients. A survey of female pa-

tients in 2013 at a HCW versus General Cardiology office showed that 55% (HCW) and 88% (General Cardiology) of women did not have a preference for a female cardiologist but did prefer a physician with expertise in heart disease in women.⁵⁴

FUTURE STRATEGIES FOR HCW

Future HCW education efforts should be targeted to be effective and culturally relevant to all women. Table 2 outlines the 4 pillars of HCW care for the future of outcomes for women. Younger women and racial and ethnic minorities have lower rates of awareness and higher rates of CVD mortality and more risk factors.² These disparities are most evident in women aged 35 to 54 years, in those with lower levels of education, and among racial and ethnic minorities. As described in an earlier section, younger women, in particular, are less aware of their risks, have delayed diagnosis, face inconsistent responses from the healthcare system, have underestimation of their disease severity, receive suboptimal treatment, and ultimately have worse outcomes.⁵⁵ There is a paucity of evidence on interventions that have been implemented to reduce CV healthcare disparities in women, and more research is needed to understand the exact mechanisms through which social determinants contribute to the social gradient of CVD and what works to reduce these inequities.² Younger patients, in particular, are often not informed by providers that they are at increased risk, let alone prescribed strategies to modify their risk for heart disease.³¹ Even in patients presenting with acute MI, there are often delays in workup and diagnosis because healthcare workers are not consistently responsive to young women and often underestimate the severity of their disease.³³ In addition, young women who present with MI may have uncommon etiologies such as spontaneous coronary artery dissection, coronary microvascular dysfunction, and coronary vasospasm, further delaying diagnosis and appropriate care.⁵⁶

Decades of evidence support differences in the quality of care received among women of diverse race and ethnicity and the struggles by women to achieve reliably high-quality and equitable CV health care. These inequities in the delivery of CV care also contribute to poor clinical outcomes and worsening CVD risk factors for midlife women, especially among socially disadvantaged subgroups.^{57–59} Data from 2001 to 2010 demonstrate that the prevalence of CHD was 47.7% among black women over the age of 20 years in comparison with 35.1% in non-Hispanic white women and 33.3% among Hispanic women.^{57,59} These differential comparisons are similar for the prevalence of angina, the incidence of MI, and for CHD death rates. Of note, for those over the age of 64, the incidence of MI in black women is even higher than that of white men.⁵⁷

Table 2. Future Goals of Heart Centers for Women Programs

Clinical care
Develop evidence-based approaches to care incorporating existing sex- and gender-based guidelines
Provision of comprehensive patient-centered care customized to address cultural, ethnic, spiritual, and social determinants of the patient
Creation and implementation of a multidisciplinary healthcare team for women incorporating clinicians who care for women to improve the quality and equitable healthcare gaps in women including family physicians, primary care physicians, obstetricians and gynecologists, nurse practitioner, emergency department physicians, and nurses
Education and health literacy
Sex- and gender-specific cardiovascular education for all healthcare professionals
Patient education that integrates the tenets of health literacy
Development of educational modules and tool kits to facilitate the delivery of sex- and gender-specific cardiovascular care for women
Community partnership
Creation of pathways to facilitate engagement with community groups and community health center staff to increase awareness of cardiovascular disease in women and provide information on navigating appointments with the medical team and health system for optimal cardiovascular care
Develop models of community-based participatory research to better assess unique cultural-, racial-, and community-based healthcare needs of women and to implement culturally sensitive approaches to meeting the needs of underserved populations of women
Commitment to research
Work with federal agencies, pharmaceutical, and device companies to continue to expand on current sex and gender registries and clinical trials and to ensure recruitment and participation of substantial numbers of women of diverse races and ethnicities
Develop novel research designed to investigate the impact of the social, racial, and ethnic determinants on cardiovascular health and disease in women and to gain insight into specific components that lead to high cardiovascular burden in black and South Asian women.
Devise measures to assess the effectiveness of guidelines for the prevention, diagnosis, and treatment of women with cardiovascular disease

Studies in migrant South Asian populations have shown MI and CHD deaths that are 4 times the rate of the general world's population, with higher rates of premature CHD even with similar levels of risk factors.¹ South Asian women have high overall heart disease rates, approaching those of South Asian men, and their CHD mortality rate is much higher than that of white women.⁶⁰ These are issues that must be targeted by HCW, and CV health care in general, as well, going forward because we live in an increasingly diverse society.

Expansion of the HCW and CV healthcare delivery model to include attention to the social determinants of health is essential for achieving CV health equity for all women.⁶¹ The unique aspects of nonclinical factors that affect the health of women, termed the "gendered structural determinants of health" in a 2007 report by the World Health Organization's Women and Gender Equity Knowledge Network, affect the health and outcome of women at risk of or with CVD.⁶² The social determinants of health impact the CV outcomes in wom-

en.⁶² These determinants include health literacy, lower education achievements, low-wage jobs, higher rates of poverty, and more familial responsibilities, coupled with societal discriminatory norms and practices. The incorporation of biological differences, and the multiple dimensions in which bias or disparities might exist, as well, and which account for outcomes and opportunities in women's CV care, must be integrated into the healthcare delivery models including HCW.⁶¹

Thus, a HCW holistic healthcare delivery approach which is inclusive of diverse factors such as heart-healthy messages that are culturally customized to the individual woman is essential to promote the elimination of CV healthcare disparities.⁵⁸ These disparities are often best addressed by bringing the HCW to the community. Community-based HCW programs provide accessibility and better address many of the barriers to care faced by the women they serve.⁶³ This is particularly important for black and Latina women who are at high risk for heart disease.⁵⁹ One academic HCW program launched a population health research project to screen 10 000 black women for hypertension and CVD risk factors in a metropolitan city.^{64,65} The screenings are done in partnership with community organizations such as churches and shopping centers in the locations most likely to serve high-risk women.

Moving forward, a more global approach that includes the tenets of diversity, inclusion, and health equity and addresses the full spectrum of social determinants of health is essential. HCW can help achieve this goal by developing HCW programs that draw on the strengths of all segments of a diverse society. Future strategies for HCW to improve CVD care for women are listed in Figure 2. Critical components of an effective HCW include increased efforts geared toward sex- and gender-specific research, excellent patient care, improved awareness, education individually and culturally targeted to women, and sex- and gender-specific academic training for all providers of CV care for women.

SUMMARY

HCW continue to offer unique settings in which to deliver female-focused and -tailored comprehensive CV care and education, ensure appropriate diagnostic testing, and continue sex- and gender-specific CV research while monitoring the effectiveness of treatment. The gap in overall mortality from CVD has narrowed, but HCW face the challenge of reducing CVD in the groups of women remaining at the highest risk. Ethnicity, income, education, and culture should not determine CVD mortality in women. Greater emphasis on risk reduction in younger women that have a high long-term risk for CVD is essential.

Changes in academic curriculum that include sex- and gender-specific clinical training, cultural and di-

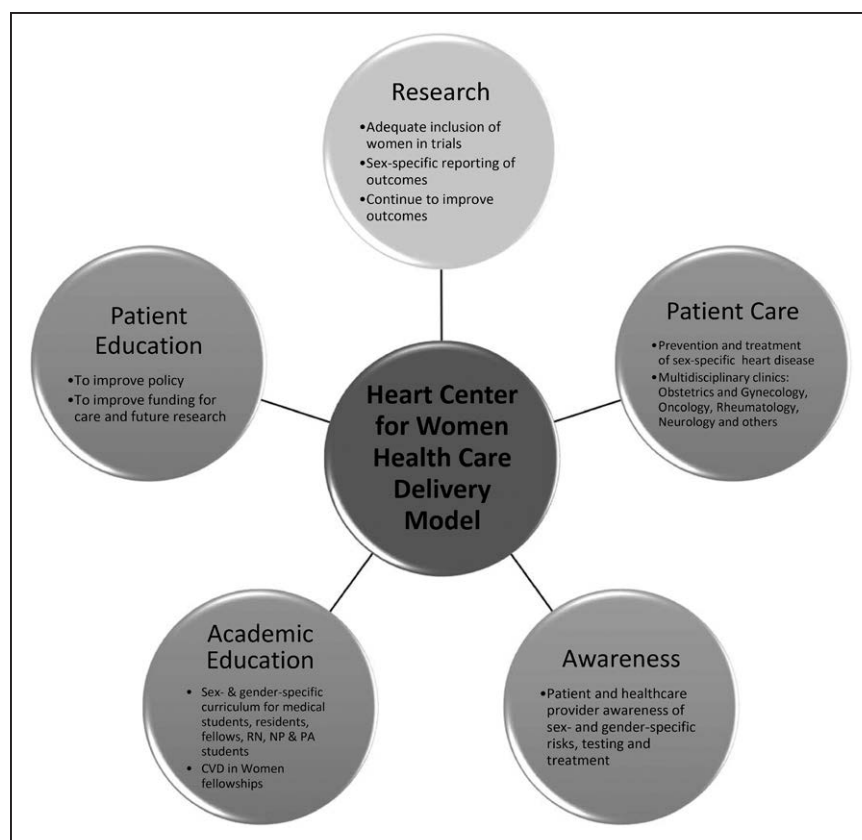


Figure 2. Future strategies to reduce cardiovascular disease in women through Heart Centers for Women healthcare delivery model.

CVD indicates cardiovascular disease; NP, nurse practitioner; PA, physician assistant; and RN, registered nurse.

versity training, and the importance of adherence to evidence-based guidelines are essential. Continuing medical education programs and journal publications should stress the importance of increased sex- and gender-specific studies on CVD in women to enhance knowledge and quality of care. Interventions are still needed to raise awareness among the general public, and the physician awareness data underscore the need for campaigns targeted to healthcare providers. The healthcare team must be expanded to include all providers who care for women, including advanced practice providers, dietitians, nutritionists, exercise physiologists, psychological counselors, and noncardiology specialties. Increasing the numbers of male colleagues engaged in these programs, clinical care, and research projects is essential. Going forward, HCW should have as much diversity in their programs as the diversity found among the women they serve. Together HCW, patient-directed groups, advocacy groups, and research institutions can eliminate the remaining disparities in CVD for women and improve heart disease outcomes for all women equally.

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None.

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