

Exploring Demographic Health Differences—A Foundation for Addressing Health Disparities in Cardiovascular Disease

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The theme of this issue of *The American Journal of the Medical Sciences* is “Exploring Demographic Health Differences—A Foundation for Addressing Health Disparities in Cardiovascular Disease.” There have been significant improvements in health indicators in the United States and developed countries over the last 20 years. However, evidence indicates that the improvements are not consistent across all groups of people with rates of disease, premature death and disability disproportionate across race/ethnicity, age and gender. Simply stated, health disparities refer to differences between groups of people. These differences can impact how frequently a disease affects a group, how many people get sick or how often the disease causes adverse health outcomes. Healthy People 2020 define a health disparity as “a particular type of health difference that is closely linked with social, economic and/or environmental disadvantage. Health disparities adversely affect groups of people who have systematically experienced greater obstacles to health based on their racial or ethnic group; religion; socioeconomic status; gender; age; mental health; cognitive, sensory, or physical disability; sexual orientation or gender identity; geographic location or other characteristics historically linked to discrimination or exclusion.”¹ Thus, health disparities result from multiple factors including not only poverty, environmental dangers and inadequate access to health care, but also individual and behavioral factors and educational inequalities.

There is a critical need to develop knowledge and strategies to address this crisis. A first step is a better understanding of important differences in etiology, management and outcomes by race, age and sex. This knowledge can foster development of interventions tailored to individual needs and delivered at the right time to achieve the right outcome across all groups of people. This symposium issue includes a collection of articles that explore differences in cardiovascular and related diseases and thus provides a foundation for addressing health disparities in these chronic conditions.

The first 2 articles presented in this symposium issue highlight the effect of early life experiences in boys and girls on cellular markers of stress and aging and health outcomes in adulthood. In a sample of inner city children subjected to social stressors, Drury et al² found a significant association between 2 distinct biological markers, telomere length and testosterone reactivity, supporting the hypothesis that these factors are biologic markers of stress-related changes in development and aging. Furthermore, although stress exposure impacted development trajectories in both sexes, sex of the child significantly modulated the

association between telomere length and testosterone, with testosterone reactivity being significantly associated with telomere length in males only, a finding that has not been previously reported. Future research examining the association between early life stress and telomere length in children should consider sex differences to further enhance our understanding of the relationship between puberty, hormone stress responses and cellular aging in youth as underlying mechanisms linking later life health outcomes with early life stress. In the second article, Li et al³ extend current knowledge regarding racial and sex differences in cardiovascular risk factors and related cardiovascular risk from childhood to adulthood by identifying associations between childhood risk factors and adulthood arterial stiffness (ie, brachial-ankle pulse-wave velocity) by race and sex. Using data from the Bogalusa Heart Study, the authors reported childhood systolic blood pressure as the only significant predictor of adulthood arterial stiffness. Assessment of interactions by sex and race revealed significant interactions on adulthood arterial stiffness between sex and childhood body mass index, sex and childhood low-density lipoprotein (LDL) cholesterol and race and childhood high-density lipoprotein cholesterol. The positive association between females, body mass index and arterial stiffness suggests that females may be more vulnerable to the adverse effect of obesity in childhood. Sex differences in the relationship between childhood LDL cholesterol and adult arterial stiffness suggest that males, particularly white males, may be more vulnerable to the adverse effect of increased LDL cholesterol on the arterial stiffening process. A better understanding of the impact of early life experiences, including stress and disease risk factors by race and sex on aging and health outcomes, has important potential implications for early race- and sex-specific interventions that may mitigate health disparities in adulthood. Future research is needed to address the feasibility and effectiveness of such programs.

Although it is well established that statin medications reduce the risk of coronary heart disease (CHD) in high-risk individuals, heterogeneity in the use of statins across subgroups of adults at high risk for CHD events is not well known. In an effort to explore if statin use and LDL cholesterol control varied among people with CHD or risk equivalents, Gamboa et al⁴ analyzed data from the nationwide Reasons for Geographic and Racial Differences in Stroke (REGARDS) study. Four high-risk groups including individuals with CHD, a history of stroke/abdominal aortic aneurysm, diabetes or a Framingham Risk Score >20% were studied. Overall, a substantial treatment gap for the U.S. adults at high risk for future CHD events, especially for those with Framingham Risk Score >20%, was identified. Factors associated with not taking statins including being black, female gender, having a CHD risk equivalent and residing in the Southeastern United States. Tailoring of interventions to increase statin adherence especially among high-risk individuals may be needed to close this treatment gap and ultimately address disparities in treatment and health outcomes.

With the aging of the U.S. population, there is increased interest in understanding disease prevalence, progression and

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consequences in the oldest old to facilitate clinical practice guidelines implementation, decrease disparities across age groups and enhance health outcomes. The increased prevalence of reduced estimated glomerular filtration rate (eGFR) with age is well established. Recently, the Kidney Disease Improving Global Outcomes (KDIGO) Clinical Practice Guidelines for the Evaluation and Management of Chronic Kidney Disease (CKD) recommended classification of CKD by eGFR and albumin-to-creatinine ratio (ACR) category. In an effort to provide information on the prevalence and trends of eGFR and albuminuria among the oldest old, Bowling et al⁵ conducted a national serial cross-sectional analysis of the U.S. adults, 80 years of age and older, from the National Health and Nutrition Examination Survey (NHANES). They report a relatively stable proportion of the U.S. adults at least 80 years of age with an elevated ACR between 1988–1994 and 2005–2010. However, due to aging of the U.S. population resulting in growth of the oldest old, the absolute number with reduced eGFR and with albuminuria increased substantially over the last 2 decades. It is projected that the number of U.S. adults with 80 years of age of older with reduced eGFR and elevated ACR will increase 3- to 4-fold by 2050. These numbers indicate a great need to develop a professional workforce trained in the unique aspects of caring for older adults with CKD to address age-specific barriers to and determinants of positive health outcomes in older adults.

Despite the availability of effective medical therapies for the treatment of multiple chronic diseases, there is a notable discrepancy between current treatment success rates and the rates thought to be achievable overall and within sociodemographic groups. One key factor contributing to this incongruity may be patient nonadherence to prescribed therapies. Although multiple approaches to addressing low adherence have been investigated, no single intervention has emerged as particularly effective and adherence rates for chronic disease medications remain disappointingly low. Differences in medication adherence rates and in factors contributing to low adherence rates by age, sex and race signal a need for tailored interventions that address relevant barriers to adherence and lead to improved clinical outcomes. Krousel-Wood et al⁶ propose a novel way to understand patient nonadherence to chronic disease medications by exploring whether patient hidden motives contribute to nonadherence. The immunity-to-change framework, a transformative learning process used successfully in work settings, revealed patient hidden motives and their underlying assumptions contributing to chronic disease medication nonadherence in a sample of predominantly younger women filling prescriptions at chain pharmacies. This proof-of-concept article supports the need for future research to test this approach in larger general population samples and determine if addressing hidden motives and the underlying assumptions improves adherence and ultimately disease control in different patient groups.

The review article by Muntner et al⁷ provides important insights regarding the new U.S. guidelines for the management of hypertension, an important modifiable risk factor contributing to cardiovascular disease and the number 1 cause of the death in the United States. Recently published guidelines in the United States and in Europe suggest a higher treatment threshold and higher blood pressure treatment goal than previously recommended for older adults. The new recommendations are based on the available evidence to date from randomized controlled trials regarding the benefits of different levels of blood pressure control in older adults. The authors of the guidelines have emphasized the paucity of data from randomized controlled trials that exists to make definitive recommendations

on target blood pressure levels among the elderly. This review article highlights 2 gaps in hypertension management: lack of an optimal systolic blood pressure treatment goal for older adults and the effect of health status and frailty on systolic blood pressure treatment goals. Two large ongoing trials including older adults (Systolic Blood Pressure Intervention Trial—SPRINT and the Stroke in Hypertension Optimal Treatment Trial of the European Society of Hypertension and the Chinese Hypertension League—ESH-CHL-SHOT) may provide important and new information regarding risks and benefits of different blood pressure treatment targets in older adults.

The article by Lackland⁸ provides an overview of racial disparities in hypertension and hypertension-related disease outcomes. Specifically, higher prevalence of hypertension and higher excess CVD risk associated with hypertension in African Americans compared with their white counterparts are discussed. Although there is a great need for evidence-based guidelines that address hypertension management in high-risk populations including African Americans, there are inadequate data from randomized trials and clinical studies to develop specific guidelines for these groups. More research is needed to address this knowledge gap and subsequently reduce the racial disparity and improve health for all.

Mills et al⁹ summarize interventions to improve hypertension management and described the rationale and study design for a cluster randomized trial testing whether a comprehensive intervention program targeting the primary care system in Argentina will improve hypertension control among uninsured hypertensive men and women and their families. Given the relative lack of data demonstrating the effectiveness of proven lifestyle modification and antihypertensive medication treatment for hypertension control in community-dwelling populations seeking primary care, the proposed study will provide key information regarding effectiveness, practicality and sustainability of an intervention program to control hypertension in underserved populations in low- and middle-income families. If successful, the results from this trial may be directly used by other primary care systems in low- and middle-income countries for the prevention and control of hypertension in patient populations, which are socioeconomically disadvantaged.

In addition to disparities in the diagnosis, treatment and control of CHD, there are also differences in the use of cardiac rehabilitation (CR), medically supervised exercise programs designed to improve function, exercise capacity, quality of life and CV outcomes. Menezes et al¹⁰ summarize benefits of CR and report overall low participation rates by patients diagnosed with CHD. Women, minorities and those of different ethnic backgrounds have worse referral rates than their male and white counterparts. Furthermore, evidence suggests that even after referral, the CR enrollment and completion rates are lower among females and minorities. The authors provide recommendations for overcoming barriers to CR referral and enrollment for women and minorities and tailoring interventions to improve CR completion rates for all patients with CHD and ultimately reduce disparities in these high-risk individuals.

The last article in this issue is a thought-provoking commentary by Molix¹¹ suggesting a nontraditional risk factor for CVD, which may contribute to health disparities between women and men. Specifically, she proposes the influence of sexism, a psychological stressor experienced by some women, which should be more fully explored as a risk factor for CVD. There is a need for population-based studies to explicitly examine the relationship between sexism and CVD and its potential role in sex disparities in cardiovascular outcomes.

In conclusion, there is an urgent need to better understand health differences across patient groups to facilitate tailoring of interventions to improve disease management and ultimately health outcomes and reduce disparities across age, sex and racial groups. This symposium issue highlights several key areas where notable differences exist in cardiovascular and related diseases and provide direction for future research. We are grateful to our contributors of the symposium issue and anticipate that the readers will find this issue informative.

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