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Disparities in the COVID-19 pandemic: A clarion call for preventive cardiology

1. Introduction

The disproportionate burden of COVID-19 among racial/ethnic populations necessitates early identification of the clinical, behavioral, and cultural factors that contribute to health inequities before, during and after the pandemic. Clinicians and public officials must continue to develop strategies to reduce disparities in morbidity and mortality due to SARS-CoV2. Furthermore, preventive cardiology should target improving cardiometabolic and cardiovascular health, especially in racial/ethnic populations. The best pathway to overcome the distressing high degree of death and disability due to COVID-19 is via immunization uptake and vaccine access, utilizing trusted leaders within various communities to address common vaccine misconceptions and barriers.

Although the early 2021 surge resolved, but the price of the pandemic, with lingering spikes, has been tremendous in terms of hospitalization, death, and psychological and financial distress. Between March 1, 2020, and January 2, 2021, the US experienced a 22.9% increase in all-cause mortality, far exceeding the expected increase ($\leq$ 2.5%) and representing 522,368 excess deaths. Unfortunately, the excess death rate was higher among non-Hispanic Black persons (208.4 deaths per 100,000) than non-Hispanic White or Hispanic/Latinx populations (157.0 and 139.8 deaths per 100,000, respectively). These disparate deaths in Black Americans surpass their share of the US population (12.5%) and confirm the racial disparities in COVID-19 mortality recognized early in the pandemic [1].

For 2020, COVID-19 was the third leading US cause of death and daily mortality escalated to monumental levels in early 2021 to levels greater than for heart disease and cancer [2]. In addition, the US lost a whole year of life expectancy and specifically for Black individuals, it was nearly three times worse, with the reductions in the 2020 life expectancy due to COVID-19 disproportionately impacting Black and Hispanic/Latinx populations and increasing the well-documented, long-term White/Black mortality gap [3].

One unique aspect of the present public health crisis is the confluence of nationwide concerns regarding social injustice, racial inequities, and longstanding health disparities, which predate and postdate COVID-19 inequities. Although COVID-19 has affected everyone in the US, and globally, there is a well-documented higher risk in older adults, racial/ethnic populations (Native Americans, American Indians, non-Hispanic black adults and Hispanic/Latinx individuals) and persons experiencing homelessness [4,5].

2. Potent COVID-19 morbidity and mortality risk factors

Despite racial/ethnic and socioeconomic status impacts on adverse pandemic outcomes, age is the most potent risk factor for severe COVID-19: compared to persons 18–29 years old, individuals 65–74 years of age have a 5 times higher rate of hospitalizations and 90 times higher rate of death [6].

In addition, COVID-19 hospitalizations were highest among American Indian/Alaskan Native, non-Hispanic Black and Hispanic/Latinx individuals as compared to the non-Hispanic White individuals. Moreover, the impact of co-morbid cardiometabolic conditions is indisputable. In a cohort (N = 20,736 adults) with a diagnosis of COVID-19 in 2020, hypertension was the most common pre-existing condition, present in more than half of patients and diabetes in just over a third of patients. Importantly, there is a profound impact of obesity on COVID-19 morbidity, and for those patients on admission to the hospital, the mean (SD) BMI was in the obese range (i.e., 30.8) [7].

3. Cardiometabolic burden in racial/ethnic populations

Concerning disparities in health, the past is prolog. Even more than in the past, preventive cardiology is a necessary tool to diminish death and disability across all populations and the COVID-19 pandemic further unmasked racial/ethnic disparities in cardiometabolic health. For decades, while health, life expectancy and overall care had improved dramatically for all Americans over the last century, the distribution of benefits has not been equitable [8]. There has been a persistent mortality gap between White and Black Americans since the 1960s. This White/Black death gap is primarily driven by cardiovascular disease and cardiometabolic conditions. The COVID-19 pandemic further unmasked racial/ethnic disparities in cardiometabolic health, with African American adults having more prevalent and severe hypertension, increased type 2 diabetes, more prevalent and severe obesity, especially in Black females, premature myocardial infarction, increased stroke and mortality, prevalent chronic kidney disease, higher risk for end stage renal disease, heart failure-related death and premature cardiovascular mortality [9,10]. These multiple findings are the underpinnings for the significant gap in life expectancy: non-Hispanic Black males (71.5), non-Hispanic White males (76.1), non-Hispanic Black female's life expectancy (78.1), and non-Hispanic white females (81.1) [11].

An additional marker for adverse cardiometabolic health is the higher rate of age adjusted prevalence of physician-diagnosed diabetes: 14.1% in Black adults, 13.6% in Black female adults, 12.6% in Hispanic/Latinx male adults, and 12.7% in Hispanic Latinx female adults [12]. Non-Hispanic Asians were also noted to have higher rates of diabetes compared to non-Hispanic whites: 11.8% in male adults, 9.1% in female adults, 8.0% for non-Hispanic White male adults and 7.4% for non-Hispanic White female adults [13].

4. Obesity, cardiac biomarkers and COVID-19

Obesity may be a key link to severe COVID-19 in African American and other racial/ethnic populations? Increased obesity and diabetes, linked to adverse outcomes in COVID-19 in communities of color, reflect social conditions and policies that created environments promoting unhealthy behaviors. Structural racism includes redlining in urban cities

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and displacing indigenous communities into reservations. Higher cardiometabolic risk is hence tied to inadequate affordable housing, limited security impacting desirable locations to pursue physical activity, and food desserts [14]. Black women in the US have the highest rates of obesity among racial/ethnic groups, enabling high COVID-19 outcomes and may be key to understanding the higher African American mortality [15]. A retrospective study in African American individuals ($N = 158$) conducted at a New Orleans tertiary center noted BMI as a continuous variable with intensive care admissions, with 61% of women and with a relatively young mean age of 57 years [16].

Moreover, prevalence of severe obesity in the US (2017–2018), defined as body mass index greater or equal to 40, was 13.8% in non-Hispanic Black adults compared to 9.3% in non-Hispanic White adults, 7.9% in Hispanic/Latinx adults and 2.0% in non-Hispanic Asian American adults. The rates of obesity are especially high in non-Hispanic Black women with 56.9% prevalence of obesity in adults [17].

Therefore, COVID-19 hospitalization and death is fueled by several associated cardiometabolic conditions: diabetes (often uncontrolled), obesity, and hypertension [18]. Metabolic and inflammatory pathways may adversely alter the course of COVID-19 with obesity with regards to dysregulating immune responses with excess adipose tissue eliciting a virus-activated cytokine storm syndrome [19].

Biomarkers may identify heightened inflammatory response, for example, in endothelial dysfunction and microvascular damage. In a review of 56 studies from January-May 2020, cardiac biomarkers, including troponin I and aspartate aminotransferase, were associated with increased mortality, severity, and cardiac injury in COVID-19 patients ($P < .001$) [20].

5. Social determinants of health and COVID-19

There is no genetic marker or definitive physiologic reason for the poor outcomes in members of US racial/ethnic populations due to COVID-19. On the other hand, African American and other patients are extremely vulnerable to the effects of COVID-19 due to a mixture of many difficulties, based on the social determinants of health (SDOH), which compound or even extend the burden of comorbid, conventional SARS-CoV2 risk factors.

A 2020 retrospective study ($N = 1382$) of an integrated health system in Louisiana confirmed higher rates of COVID-19 hospitalizations among non-Hispanic Black adults compared to non-Hispanic White adults. Prior to the pandemic, the Black patient population in this health system was 31% non-Hispanic Black adults and 65% non-Hispanic White adults. However, in those who were hospitalized for COVID-19, non-Hispanic Black patients were the majority at 76.9% [9]. Interestingly, the median age of non-Hispanic White adults was significantly higher in this cohort at 69.2 years as compared to 60.5 years for Black patients. The impact of the social determinants of health was also clearly noted with higher rates of Medicaid status and residence in low-income areas among the hospitalized Black patients. There were higher percentages of Black patients for multiple conditions as compared to White patients: obesity (53.9 vs. 39.5%); diabetes (18.5 vs 10.9%); hypertension (33.8 vs. 23.9%); chronic kidney disease (9.4 vs. 4.6%) [9].

Furthermore, recent data have linked social vulnerability and COVID-19 incidence in Louisiana, an area of higher COVID-19 burden and low vaccination. In consideration of similar mortality rates among diverse hospitalized patients, the higher incidence and hospitalization among racial/ethnic populations reflects a higher baseline susceptibility to infections due to underlying social vulnerabilities [21]. The Centers for Disease Control and Prevention (CDC)'s Social Vulnerability Index (SVI) directly correlated to COVID-19 incidence among Louisiana census tracts, after adjusting for population density [21]. Therefore, areas which have high COVID-19 mortality are also areas which have increased social vulnerability, as seen in Louisiana, and also noted in Chicago [22,23].

In order to reduce and eventually eliminate pandemic racial/ethnic imbalances, additional resources should be allocated to areas of increased social disadvantage to reduce the incidence of COVID-19 in vulnerable populations. A nation-wide study on county-level COVID-19 cases and deaths ($N = 3220$), including all 50 states, Puerto Rico, and the District of Columbia, documented that income inequality within US counties was associated with more cases and deaths due to COVID-19 in the summer months of 2020. In the final analysis, the COVID-19 pandemic highlights vast disparities that exist in health outcomes owing to income inequality in the US, and for which race/ethnicity is a marker [24].

The profound intersection of the SDOH and race/ethnicity was clearly seen with poorer outcomes demonstrated in workers in meat and poultry processing facilities. Among affected plant workers with reported race and ethnicity, 87% were members of racial/ethnic minorities [25]. Suggested corrective steps to curtail and eliminate such disparate workplace outcomes include: providing culturally appropriate health education materials, screening workers for possible infection, encouraging hand hygiene and use of facial coverings, increasing space between workers and perhaps most importantly, encouraging workers to take sick leave when needed. These numerous variables making African American and other populations more vulnerable to COVID-19 include: working in service industries or "essential jobs" with exposure to infection: using public transportation to get to work when others were able to work at home; lack of early access to testing; and a historical distrust of the healthcare system due to previous bias [26]. This increased mortality in Black persons is a "sentinel event", a marker for overall poor healthcare similar to events that reveal poor hospital care when evaluated by the Joint Commission [27].

6. Preventive approaches to overcome the COVID-19 pandemic

The best means of ending the COVID-19 pandemic has been the widespread availability of safe and effective vaccines against infection, hospitalization, and mortality due to the SARS-CoV2. Natural immunity, perhaps while less effective in terms of antibody levels or length of protection, may also have the unintended consequence of the development of Post-Acute Sequelae of SARS-CoV-2 infection (PASC) (long COVID) [28]. In patients that had hypertension and diabetes, 35% of a cohort ($N = 177$) experienced ongoing symptoms 6 months post infection [29]. There are currently three vaccines, authorized and recommended for use in the US, that appear safe and effective, other than isolated serious side effects, such as the unexpected although rare, complication of clotting with Ad26.COV2.S, which uses a recombinant, replication-incompetent adenovirus serotype 26 (Ad26) vector. Women younger than 50 years should be aware of the rare risk of clotting with low platelets after vaccination with this agent [30].

Addressing the urgent need to overcome barriers to COVID-19 vaccinations are similar to those previously experienced with influenza vaccination. Factors that contribute to decreased vaccine acceptance, uptake and adherence must be recognized: long-standing mistrust in orthodox medicine, widespread fear of dangers and efficacy of vaccines, and lack of targeted programs to overcome barriers [31]. In an effort to eliminate COVID-19 racial/ethnic disparities in outcomes and vaccination, the Louisiana Governor's Health Equity Task Force provides reliable and data driven information on COVID-19 safety and prevention, affords the local medical community with evidence-based protocols for treating communities with underlying medical conditions and health disparities, and targets testing availability and access for all communities [32].

Similarly, in order to overcome misinformation, barriers and low confidence in COVID-19 vaccines, specifically in communities of color, the National Institutes of Health (NIH) Community Engagement Alliance (CEAL) promulgates nationwide access to accurate information and resources with a guide for health care workers and community messengers providing fact-based responses to common questions. Useful,

evidence-based communication is available by fact sheets and in English and Spanish [33].

Particularly when approaching African American individuals, to overcome barriers to mistrust, it is necessary to have cultural humility. More than traditional "cultural competency," a detached mastery of a theoretically finite body of knowledge, cultural humility is a communication imperative. Some notable aspects of cultural humility include self-reflection and self-critique, learning from patients (avoiding cultural stereotyping), developing and maintaining respectful partnerships, and actively continuing these positive relationships [34].

In order to finally eliminate the ravages of COVID-19, it is necessary to debunk myths on vaccines, especially among those patients who have high risk for COVID-19 infection, hospitalization, mortality, including members of racial/ethnic minorities. One solution providers can take to improve confidence in vaccines: get vaccinated yourself, engage in effective conversations, be prepared to answer common questions, address misinformation by sharing key facts and identify vaccine ambassadors and trusted people who can answer questions about COVID-19 vaccination. The underlying cardiovascular and cardiometabolic conditions should be addressed before patients experience disparate COVID-19 outcomes. In consideration of the impact of cardiometabolic and cardiovascular risk burden, preventive cardiology should lead the way in assisting the US population in achieving health equity.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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