Racial, Ethnic, and Socioeconomic Disparities in the Diagnosis and Management of Primary Immunodeficiencies

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Racial, ethnic, and socioeconomic minorities have been documented to have poorer health outcomes for most chronic conditions, including cardiovascular disease, diabetes, cancer, and end-stage renal disease. Renewed efforts have been made recently to identifying and addressing these health care disparities, including in the field of allergy and immunology.

The article by Wallace et al contributes to this emerging body of research. They reviewed differences in diagnosis and management of primary antibody deficiency (PAD) at Boston Medical Center (BMC) from 2012 through 2019. Primary antibody deficiencies are the most commonly diagnosed primary immunodeficiency diseases (PIDD), and can predispose patients to a variety of infectious and noninfectious complications. The BMC is the largest safety net hospital in New England. Approximately 50% of their patients are Black/African American and 17% are Hispanic/Latinx. Of the 83 BMC patients with identified PAD, 9.6% were Black/African American and 10.8% were Hispanic/Latinx. In comparison, much lower percentages of patients in the U.S. Immunodeficiency Network (USIDNET) national registry of patients with PIDD were minorities (2.8% Black/African American and 3.5% Hispanic/Latinx), making the BMC cohort a unique and important population to study.

It has been shown that prompt diagnosis and initiation of immunoglobulin replacement therapy (IRT) is a critical treatment to help reduce the number of severe infections in patients with PAD. Compared with the USIDNET registry of 2,502 patients with PAD, IRT was significantly less prescribed in PAD patients at BMC. Although the BMC patients had higher median immunoglobulin G (IgG) values overall than those in the USIDNET cohort, IRT was still significantly less prescribed among those with severe PAD (IgG < 500 mg/dL) in the BMC cohort. It was then noted that there were a greater number of infections and long-term sequelae among minorities and those of lower economic status.

This could be partially related to less access to IRT treatment. Pneumonia and bronchiectasis occurred significantly more often in Black/African Americans than all others in the BMC cohort. It was also found that those of lower median household income had higher rates of bronchiectasis. Finally, compared with patients in the USIDNET registry, the Black and lower median household income patients at BMC had significantly higher rates of bronchiectasis. If bronchiectasis is not identified and appropriately managed early on, it can lead to permanent lung damage resulting in decreased exercise tolerance, increased hospitalization rate, impaired quality of life, and early death.

Whereas this study specifically examined disparities in the diagnosis and management of PAD, other studies of patients with PIDD also highlight similar disparities. The prevalence of PIDD in the United States from 2001 to 2007 was estimated using International Classification of Diseases, Ninth Revision (ICD-9) codes from commercial health insurance and Medicaid claims from multiple states. All PIDD, except neutrophil defects, were found to be more than twice as prevalent in White patients than in Black and Hispanic patients. An important question that remained to be answered after this study is how much racial/ethnic factors influencing genetic diagnoses, versus biases and barriers to health care access, explained the observed higher prevalence of PAD/PIDD among White patients. One study of this used an objective scoring algorithm to evaluate all hospitalized patients 60 years old or younger with 2 or more of 174 ICD-9—coded complications associated with immunodeficiency. Of these identified immunodeficient patients, 86% were Black or Hispanic and nearly two-thirds were insured through Medicaid, similar to the prior study in which privately insured patients were found to have a higher prevalence of all PIDD. Another study involved a national survey of 1,250 primary care physicians to determine their current practice regarding the diagnosis of PIDD. They found that physicians who took care of higher socioeconomic status patients ordered laboratory testing to evaluate for PIDDs more often. Thus, underdiagnoses among minority and lower socioeconomic status populations clearly can occur and likely explain at least some of the observed racial differences in prevalence.

Even after patients are diagnosed with PIDD, differences in outcome exist that may also be a result of disparities in access and overall care. As Wallace et al highlight, one factor that may have contributed to differences in outcomes among the BMC PAD cohort of patients was having less access to specialized immunology care provided by experienced clinical immunologists than the USIDNET registry patients. As a safety net hospital with more than half of patients below the federal poverty level for income and two-thirds uninsured or with government-sponsored
insurance, BMC may face similar challenges to hospitals with fewer resources managing PADs.

This article is an important first step in identifying disparities in the diagnosis and treatment of PADs. The retrospective nature and overall small sample size of this single-center study make it somewhat difficult to generalize the conclusions. Larger studies are needed to determine the scope of this problem. Worldwide, there are few registries reporting the prevalence of specific PIDDs by race and socioeconomic status. Establishing such international registries will allow the field to understand how applicable these trends are outside of the United States. For example, it has been shown that developing countries have a lower prevalence of common variable immune deficiency. This brings further support to the idea that socioeconomic factors and access to tertiary medical care may be limiting factors for the diagnosis of PAD globally.

It is imperative that, once such disparities and barriers are identified, we confront them and take action to promote the unbiased care of patients with PIDD. One example of a less-biased approach that has been implemented in the United States is universal newborn screening for severe combined immunodeficiency, which also can identify other T-cell defects. Scoring algorithms and artificial intelligence could also potentially be used to identify PIDD patients in a less-biased manner and speed time to diagnosis. Finally, factors such as affordability and access to treatments such as IRT will be important items to address as we strive for a more health-equitable state.

REFERENCES