Evaluating the Elimination of Race from PFT Equations

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Objective: To describe an approach for clinicians and healthcare systems to evaluate the removal of the race multiplier from pulmonary function testing (PFT) estimation equations.

Background

Pulmonary function tests measure lung volume and the rate of flow through airways to aid in diagnosis and monitoring of lung disease.[1] To interpret PFTs, current guidelines recommend comparing a patient's results to predicted values derived from healthy populations of the same age, sex, height, and race/ethnicity.[2] The recommendation to adjust for race/ethnicity comes from a body of research dating back to the 19th century,[3] which suggested that Black people have a lower lung capacity than white people, after adjustment for age, sex, and height. In addition to reifying white bodies as inherently "normal" and Black bodies as "other", these differences, interpreted as biological inferiority of Black people, were notably also used to defend slavery.[3,4]

The American Thoracic Society currently recommends the use of Global Lung Function Initiative (GLI) and previously recommended the NHANES III reference equations.[5] The NHANES III spirometry reference equations provide separate values for White, African American, and Mexican Americans living in the United States,[6] and later added a correction factor for Asian Americans.[7] The GLI equations merged lung data sets of 74,187 individuals from 26 countries, including NHANES III, and provides separate coefficients for White, African American, North East Asians and South East Asian race/ethnicities.[8] For those not represented by those race/ethnic groups, a composite equation that averages the four groups is provided.[8] When using either the NHANES III or GLI reference equation, with the race-specific equations, a Black individual will have a higher percent-predicted lung function value relative to that of a White individual, when holding all else constant, including absolute lung function values.[9]

Adverse Implications of Race Adjustment

Race, a socially constructed category, is not a reliable proxy for biologic differences. Many of the studies supporting the finding of a racial/ethnic difference in lung capacity failed to define race/ethnicity among their participants. And, few of these studies adjusted for potential confounders such as social, environmental, and occupational exposures.[9,10] Based on these limitations, the finding of a racial/ethnic difference in lung capacity – and the associated race/ethnicity adjustment of PFTs – has been called into question. [3,9,11] Further, since the race/ethnicity adjustment for PFT results in a Black individual appearing healthier, concerns have been raised that this practice may contribute to delays in care for Black people and potentially other racial/ethnic groups.[4,12]

The use of race/ethnicity in prediction for spirometry reference equations may lead to underestimation of COPD severity in Black individuals,[10] and has also not been shown to improve the prediction of chronic lung disease events compared to equations without race adjustment.[13] For example, removal of Black race correction in an analysis of 14,080 PFTs in Black patients led to an additional 1.7% and 4.7% of patients being diagnosed with obstructive and restrictive lung disease, respectively.[14] For those participants already diagnosed with obstructive, restrictive or mixed lung disease, the removal of the Black race correction led to a higher severity of disease for 48.6 percent of those patients.[14] These findings suggest that the

Black race correction may contribute to delays in treatment of pulmonary disease, as well as in access to referrals for rehabilitation programs, disability support, and even lung transplantation.[9,12] Additionally, several studies have found that after adjusting for age, sex, and height, Black and White individuals with the same forced vital capacity (a core PFT measure) have similar mortality rates, which raises the concern that predicted values from current race-adjusted reference equations underestimate the risk of mortality in Black patients.[15-17]

Proposed Research & Evaluation Plan
Once CERCA members align on the revised algorithm and implement it, we recommend conducting a pre-post analysis of its impact on the following measures.

1. Primary measures (stratify by race/ethnicity):
    a. Diagnosis of lung disease
    b. Referral to pulmonologists
    c. referral to pulmonary rehabilitation
2. Secondary measures pending data availability (stratify by race/ethnicity):
    a. Prescription of medications for lung diseases as recommended by COPD and asthma guidelines
    b. Hospital 30-day and all-cause readmission rates
    c. All-cause mortality rates for COPD hospitalizations
    d. Access to disability services

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