Considerations Regarding the Use of the PREVENT Calculator in Brazil

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The Brazilian Society of Cardiology (SBC) has updated the Brazilian Guideline on Hypertension[1] and the Brazilian Guideline on Dyslipidemias and Prevention of Atherosclerosis,[2] defining the PREVENT[3] calculator as the basis for estimating cardiovascular risk. However, we believe that some considerations are warranted regarding the adoption of this calculator in our guidelines.

The PREVENT calculator offers significant innovations: a lower minimum age for estimation (30 years); the incorporation of additional risk factors (estimated glomerular filtration rate, body mass index, albuminuria, and glycated hemoglobin); very long-term prediction (30 years); and outcomes related to heart failure. It was developed using large cohorts and electronic health records comprising over 6 million adults from the United States, demonstrating good internal validity and an excellent area under the receiver operating characteristic curve (AUROC).[3]

Nevertheless, a prognostic model must demonstrate good discriminatory ability, be adequately validated and calibrated for the target population (in this case, the Brazilian population), and positively affect the treatment of the conditions of interest.

Until recently, the SBC recommended the Global Risk Score (GRS), derived from the Framingham study,[4,5] whereas the American College of Cardiology (ACC) and the American Heart Association (AHA) use the Pooled Cohort Equations (PCE), which have been validated primarily in the United States population.[6-8] The World Health Organization (WHO) proposed a cardiovascular risk calculator calibrated using incidence and risk factor data from 21 global regions, in which South America was represented by Uruguay.[9] Another international standardization initiative, Globorisk, did not include validation for South America.[10] Based on Globorisk, a group of researchers developed a calculator specific to Latin America and the Caribbean (Globorisk-LAC), which has demonstrated good discriminatory ability in these populations.[11] The European Society of Cardiology (ESC) developed the SCORE2 (for individuals between the ages of 40 and 69 years) and SCORE2-OP risk calculators (for those aged 70 years and older), using a model calibrated against regional age-adjusted cardiovascular mortality rates.[12,13]

The GRS, PCE, SCORE2, WHO, and Globorisk-LAC scores have been evaluated in the Brazilian population of ELSA (Brazilian Longitudinal Study of Adult Health); they showed similar discrimination, although with lower AUROC values among women and overestimation of event rates.[14] A multinational validation study comparing PREVENT and SCORE2, which included Brazilian participants from ELSA, demonstrated similar discrimination between the scores but showed loss of calibration in regions outside Europe and North America.[15] The adoption of the PREVENT calculator in the guidelines was not accompanied by a specific external validation and calibration study in Brazil.

The innovations of the PREVENT calculator include the omission of race as a cardiovascular risk factor, based on the recognition that the excess risk observed among Black populations largely reflects social inequality. In lieu of race, the calculator incorporated the Social Deprivation Index (SDI), calculated at the ZIP code level using data from the American Community Survey, conducted between 2015 and 2020 in the United States. The SDI assesses the percentage of people living in poverty, people with fewer than 12 years of formal education, single-parent households, people living in rented homes, households without access to a car, people living in overcrowded housing, and unemployed adults under 65 years of age.[3] This index is neither available nor validated as a risk predictor for the Brazilian population. ELSA studies have shown a higher incidence of cardiovascular events among Black participants, associated with chronic exposure to social inequalities,[16] and other studies have indicated higher cardiovascular mortality in socially vulnerable areas of Brazil.[17,18] Socioeconomic indicators available for the Brazilian population, such as the Social Vulnerability Index (*Índice de Vulnerabilidade Social* [IVS], which assesses dimensions related to urban infrastructure, human capital, income, and employment), are associated with cardiovascular mortality in Brazil.[19] The inability to adjust for race (as in the PCE), socioeconomic indicators (as in the PREVENT calculator), or regional cardiovascular mortality (as in SCORE2) when predicting cardiovascular risk in Brazil may result in less intensive treatment for vulnerable populations who are most affected by cardiovascular disease.

Finally, it is also worth considering that the PREVENT calculator yields lower cardiovascular risk estimates than previous calculators, such as the PCE, with estimates that are 40% to 50% lower for the same risk factors. While this may reflect better calibration of the calculator, it also influences cardiovascular risk categorization and the determination of therapeutic interventions based on thresholds. Consequently, many patients who would previously have been classified in higher risk categories and thus treated more intensively might

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no longer qualify for preventive treatments.[20,21] The ACC and AHA promptly acknowledged this limitation; the 2026 American Guideline on the Management of Dyslipidemia reduced the low-risk threshold to < 3% over 10 years (weighing the risks and benefits of initiating lipid-lowering therapy) and set the high-risk threshold at ≥ 10% over 10 years.[21] Our guidelines have established thresholds of 5% for low risk and 20% for high risk, with the potential to reduce the number of patients eligible for pharmacological treatment and therapeutic intensification; this needs to be assessed in the Brazilian population.

Accordingly, we believe that the integration of the PREVENT calculator into Brazilian guidelines should be accompanied by initiatives designed to ensure its applicability and equity in the Brazilian population:

1) External validation and calibration of the calculator in the Brazilian population are essential and should be a research priority.

2) In Brazil, a continent-sized country with significant social disparity, it is crucial to incorporate racial, social, and/or regional inequalities into cardiovascular risk assessment at both individual and collective levels, in order to ensure that underserved groups do not receive inadequate treatment.

3) It is necessary to assess the need to adjust risk thresholds and decision-making criteria to avoid compromising preventive care for segments of the population.

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