30-year risk of cardiovascular disease may help inform blood pressure treatment decisions

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A comparison of two risk prediction tools used to calculate an individual's risk of developing cardiovascular disease (CVD) suggests
that the long-term, 30-year risk should be considered in addition to the short-term, 10-year risk to help inform when to begin medication therapy for stage 1 hypertension, or high blood pressure, according to new research published in *Hypertension*

"Many people may not have a heart attack or stroke, or develop heart failure in the next few years, yet they may benefit from lowering their blood pressure to protect them against having a heart attack, stroke or heart failure later in life," said Paul Muntner, Ph.D., M.H.S., FAHA, lead study author and a visiting professor in the department of epidemiology at the University of Alabama at Birmingham.

"Experts who develop cardiovascular disease guidelines may want to consider both near-term risk and lifetime risk for having heart disease, stroke and heart failure in lifestyle changes and treatment recommendations."

The study compared the predicted risks estimated by the American Heart Association's PREVENT risk calculator, released in 2023, to the previous tool for risk prediction called the Pooled Cohort Equations (PCE).

**PREVENT**, an acronym for Predicting Risk of (Cardiovascular) CVD Events, uses sex-specific equations; incorporates markers of kidney disease in addition to HbA1c measures to help monitor metabolic health; can estimate 10-year and 30-year risk for heart attack or stroke as well as heart failure; and considers additional risk factors with the social deprivation index.

The Pooled Cohort Equations do not calculate 30-year risk and do not include heart failure or additional risk factor predictors such as kidney function or statin use.
The Pooled Cohort Equations were designed to assess 10-year risk of heart attack and stroke for individuals ages 40 to 79, however, PREVENT can assess CVD risk in individuals from ages 30 to 79, and can predict risk for heart attack, stroke and/or heart failure over the next 10 years and 30 years.

According to the 2017 ACC/AHA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults, a predicted risk of heart attack or stroke estimated by the PCEs of 10% or greater over the next 10 years, among other criteria, was considered high risk and should prompt health care professionals to discuss blood pressure-lowering medication with their patients.

Blood pressure-lowering therapy for stage 1 hypertension includes diet and physical activity changes and medication, as appropriate.

For this study, the researchers considered a risk of heart attack, stroke and/or heart failure of 15% or higher over 10 years to be high-risk using the PREVENT calculator. In contrast, the Pooled Cohort Equations consider a risk of heart attack and/or stroke of 10% or higher over 10 years to be high-risk.

Researchers analyzed data from the U.S. National Health and Nutrition Examination Survey (NHANES) from 2013 to 2020 for 1,703 adults ages 30 to 79 years old who had stage 1 hypertension (130–139 mm Hg/80–89 mm Hg). The analysis compared participants' predicted risk estimates of CVD using both calculation methods. It found:

- Participants' average 10-year estimated risk for heart attack and stroke was 2.9% when calculated by the PREVENT calculator, in comparison to the Pooled Cohort Equations' estimate of 5.4%. This means that if treatment guidelines utilized the same threshold for PREVENT as for PCEs, some people may not be
told to start blood pressure-lowering medication therapy based on the PREVENT prediction.

- Some of these people, however, did have a high risk for heart attack, stroke and heart failure over the next 30 years, which can now be estimated by the PREVENT calculator: 55.3% of adults who had a high 10-year risk with the Pooled Cohort Equations had a low 10-year risk using PREVENT; however, the 30-year risk was greater than or equal to 30%, which may be considered high risk. This indicates the potential need for clinicians to consider both short- and long-term cardiovascular risks with their patients who have high blood pressure (BP), the authors noted.

"Many people with stage 1 high blood pressure who are not likely to have a heart attack, stroke, or heart failure within the next 10 years may have a high risk over the next 30 years," Muntner said. "People may want to discuss this with their doctors and consider starting antihypertensive medication to lower their blood pressure to reduce their risk for heart attack, stroke and heart failure across their lifetime even if they have a low short-term risk."

Study design, background and details:

- The average age of study participants with stage 1 high blood pressure was 49.6 years; 55% self-identified as men, and 45% self-identified as women. Among this group, 65.8% self-identified as white adults, 15.5% as Hispanic adults, 10.1% as Black adults, 5.8% as Asian adults and 2.7% were listed as other race or ethnicity.
- In addition, 17.2% of participants smoked cigarettes, 9.6% were taking a statin medication to lower cholesterol, 8.4% had either type 1 or type 2 diabetes, and 9.1% had chronic kidney disease.
- Study participants all had stage 1 hypertension, as determined by up to three blood pressure measurements at one appointment
during the NHANES data collection period from 2013 to 2020. Because the study was cross-sectional, blood pressure was measured during a single office visit.

- Participants had answered questions during the NHANES enrollment period about their age, sex, race, ethnicity, smoking status and having a prior diagnosis of coronary heart disease, heart attack, heart failure, stroke, type 1 or type 2 diabetes, or high blood pressure. Participants who had reported a prior diagnosis of coronary disease, heart attack, stroke or heart failure, were excluded from the analysis.

"Cardiovascular prevention is important for people who identify in all race groups and all ethnic groups. Non-Hispanic Black adults have a higher risk of stroke and heart failure in the U.S. compared with people in other groups including non-Hispanic white adults," Muntner said. "However, we know that treatments are equally effective for people in these groups. Therefore, ensuring equal access to treatments that lower blood pressure is important for all adults."

The study had several limitations. Participants' blood pressure levels were measured during a single visit in NHANES during the study period versus the two or more readings at different office visits recommended by the American Heart Association's 2017 Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults.

The researchers pooled NHANES data from 2013 to 2020 to have an adequate sample study size to produce statistical estimates of predicted risk.

During five of the years from which data was included, the 10-year risk of cardiovascular disease using the Pooled Cohort Equations was stable. Additionally, the data used was cross-sectional, meaning it examined the
characteristics of the study population at one point in time and did not include data about CVD outcomes, and therefore, the study's results cannot conclusively state which model is better at predicting the risk of developing cardiovascular disease.

"We know from emerging and growing evidence from clinical trials that blood pressure-lowering is effective at reducing risk of CVD with greater benefit among those who are at higher baseline risk," said Sadiya S. Khan, M.D., M.Sc., FAHA.

"This study highlights that the burden of stage 1 hypertension is high, and our goals as clinicians, health systems and as a society should be to focus on keeping BP as optimal as possible for as long as possible, whether this is through lifestyle and possibly initiation of blood pressure medication when lifestyle alone is not sufficient.

"The question of when to start BP-lowering medication comes from clinical trial data, such as the SPRINT trial and the recently published ESPRIT trial where intensive BP-lowering was beneficial among people with CVD or at increased risk of CVD.

"Focusing efforts on those who are at higher predicted risk with the most accurate and precise model available allows us to most effectively and efficiently improve population health outcomes."

Sadiya S. Khan is chair of the writing group for the Association's 2023 scientific statement, "Novel Prediction Equations for Absolute Risk Assessment of Total Cardiovascular Disease Incorporating Cardiovascular-Kidney-Metabolic Health."

Khan is the Magerstadt Professor of Cardiovascular Epidemiology and an associate professor of medicine and preventive medicine at the Northwestern University Feinberg School of Medicine and a preventive
cardiologist at Northwestern Medicine, both in Chicago, and was not involved in the study.

"The authors should be commended for examining both 10- and 30-year risk, as the latter is a valuable addition in the PREVENT models to enhance risk communication discussions with patients," Khan said.

"As we know from the guidelines for blood pressure, cholesterol and primary prevention, estimating risk is the first step to initiate a patient-clinician discussion, and inclusion of other risk enhancing factors are also needed.

"For example, individuals who have high blood pressure during pregnancy (preeclampsia) are at approximately two-fold higher risk of CVD and should be considered for more intensive prevention measures, including earlier consideration for initiation of blood pressure-lowering medications.

"This work also helps to highlight the importance of clinical trials in younger populations who are at high 30-year risk and select populations like those with preeclampsia to better understand the thresholds to initiate medication and the targets for treating BP with medications."

**More information:** Predicted Cardiovascular Risk by the PREVENT Equations in US Adults With Stage 1 Hypertension, *Hypertension* (2024). [DOI: 10.1161/HYPERTENSIONAHA.124.22998](https://doi.org/10.1161/HYPERTENSIONAHA.124.22998)

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