Contemporary cardiovascular risk prediction

Cardiovascular disease remains an important health problem, accounting for 3.9 million deaths every year in Europe alone.¹ To reduce the incidence of cardiovascular disease, risk prediction models are widely used for risk-tailored management, such as antihypertensive and lipid-lowering treatment. More than 350 risk prediction models have been developed for cardiovascular disease in the past decades. These models are mainly based on long-standing cohort data, but only a few models have been validated externally to test their generalisability in present settings.²

In The Lancet, Romana Pylypchuk and colleagues³ describe a new risk prediction model for cardiovascular disease that was developed from existing models to predict risk in socioeconomic and ethnic subpopulations using a very large contemporary cohort of adults aged 30–74 years in New Zealand. The predictor data collection was automatically incorporated in the primary care setting, and databases were linked with national International Classification of Diseases-coded hospitalisation and mortality registries for objective outcome data. Accordingly, hardly any data on predictors and outcomes were missing. The study is also informatively reported according to recent guidelines, and the analysis follows up-to-date methodology for prediction model studies.⁴,⁵ The investigators externally validated the predictive accuracy of the model and compared it head-to-head with that of the American College of Cardiology/American Heart Association Pooled Cohort Equations (PCEs).⁶

To further appreciate the findings, a few things are worth mentioning with respect to generalisability. The biggest problem with existing prediction models is that they typically overestimate the risk of cardiovascular disease.⁷ The investigators confirmed this for the PCEs when validated with their data. A typical explanation for this problem is that many existing models are developed from cohort data that were collected decades ago, and treatments have improved since then.⁸ The investigators mention that they had the most appropriate type of study population with which to develop and validate risk prediction models—use of contemporary data might indeed address part of the problem, but other important factors include the setting in which a model is developed and will be applied. The usefulness of this prediction model in countries other than New Zealand is also not guaranteed.

Pylypchuk and colleagues³ improved existing risk prediction for cardiovascular disease by adding predictors that address socioeconomic status, ethnicity, and comorbidities such as atrial fibrillation. The observed ethnicities, however, might only be typical for New Zealand. Moreover, ethnicity and socioeconomic predictors might not be available in many countries. Documentation of such predictor data might also be considered ethnically inappropriate in some countries, making the model less widely applicable. The investigators might still consider presenting separate prediction models, one with the traditional and widely available predictors but still based and refitted on their large contemporary dataset, and one with the addition of these new equity predictors. Also, atrial fibrillation was highly predictive for their outcome, but with a prevalence of about 1% in a young population, it is a rare disorder. So whether or not the presence of atrial fibrillation alone is enough to initiate tailored management to reduce the risk of cardiovascular disease remains an open question, making it unnecessary to include it in a risk score for cardiovascular disease.

The investigators propose that most cardiovascular risk prediction equations require measures of equity to reduce overtreatment. However, they only compared their extended model with the PCE model. They do have the unique opportunity to make this comparison with many other well developed and used risk prediction models such as the SCORE, Framingham, and GLOBORISK models.⁹,¹⁰ Finally, whether their model leads to less overtreatment or undertreatment remains to be seen—for example, in prediction model impact studies using a comparative design. A more accurate prediction model is, unfortunately, no guarantee of improved patient outcomes.

In conclusion, after decades of cardiovascular disease risk prediction based on models developed from typical long-standing cohorts and often lacking methodological rigour, we are pleased to see that a large contemporary dataset has been used to update, validate, and report a prediction model for cardiovascular disease that conforms with state-of-the-art guidance. Although some issues might still need attention, the study by
Pylypchuk and colleagues set an example to other investigators in this field.

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We declare no competing interests.