

Prediction of cardiovascular risk: it is not only in the details

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Cardiovascular disease (CVD) risk prediction receives much attention, with over 790 publications since 1 June 2018.¹ Researchers try to estimate the absolute risk that individuals free from symptomatic CVD develop a cardiovascular event in the future in the best possible way. This information may help physicians to make the best evidence-based decisions about the initiation of non-pharmacological (lifestyle advice) and pharmacological treatment. Prediction models combine information from various risk factors to estimate the absolute cardiovascular risk for an individual patient within a certain time window. Cardiovascular prediction models in primary care typically include predictors such as age, sex, smoking, markers of glucose intolerance, blood pressure and lipid levels. Yet, different versions and definitions are used in the 363 available published cardiovascular prediction models.² For example, most models include systolic blood pressure, while others include diastolic blood pressure or hypertension (i.e. binary). For lipid levels, researchers have even more options to choose from. The developers of the SCORE model, the model currently advocated in many medical guidelines in Europe, developed two different versions: one with total cholesterol as the predictor, and one with total cholesterol (TC)/high-density lipoprotein (HDL) cholesterol ratio as the predictor.³ Equally important is the issue of whether these risk models, developed in mainly Caucasian populations, hold for different ethnic groups.⁴

In the *European Journal of Preventive Cardiology*, Perini and colleagues addressed these issues, i.e. compared two cholesterol versions of the SCORE model in a large multi-ethnic cohort from Amsterdam, The Netherlands, comprising individuals from various ethnicities, including Dutch, Ghanaian, Turkish, Moroccan and Surinamese (both South-Asian and African).⁵ The study was well designed, well analysed and well reported. The differences between the two SCORE models in risk classification were small and the pattern of misclassification did not differ between ethnic groups. Only women received a slightly lower predicted risk when using the TC/HDL-cholesterol model compared to using the TC model.

Of course, it comes as no real surprise that the difference between a model with TC only and a model with TC/HDL-cholesterol is small, as these variables are highly correlated and similar risk classification has been shown before;³ it is, however, important to show that this does not affect risk classification in these various ethnicities. The importance of ethnicity in the estimation of absolute cardiovascular risk is not yet set in stone. In the United States different models are used for whites and African Americans.⁶ A recent study in sub-Saharan populations concluded that CVD risk prediction with the same algorithm differs for the migrant and home populations, and the interchangeability of Framingham laboratory and non-laboratory algorithms is limited.⁷ In our review of 363 published predictions, ethnicity was included in only 12% of the prediction models.² Potential differences between populations may come from the difference in baseline risk or differences in the magnitude of the contribution of the predictors in the model. This is well addressed in the U-Prevent approach (<https://www.u-prevent.com/en-GB>), in which different cardiovascular risk prediction models are made available for different patient groups: the elderly, those with diabetes, asymptomatic populations and symptomatic populations.^{8,9}

Rather focusing on small details in the predictors, there are other important issues of these risk prediction models that need to be dealt with. For example, the dominance of age results in fairly low risks in all women up to 55 years of age and the virtually very high risk in most elderly people, both irrespective of their cardiovascular risk profile. Furthermore, most risk prediction models have not taken competing events into account in their estimates and just provide an absolute short-term risk that is often overestimated.⁸

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These notions have led to the development of additional pieces of information, such as life-time cardiovascular risk estimates to predict CVD-free survival for an individual.^{8,9} Furthermore, prediction models have been developed to indicate whether a patient will benefit from a pharmacological intervention, to decide on starting or refraining from treatment.¹⁰

In conclusion, despite all well validated prediction models, the final decisions about the initiation of (non)-pharmacological treatment should be based on the patient's preferences and the doctor's clinical judgement in a shared decision approach, with clear expectations of benefit, potential side effects and adherence to treatment.

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