

On validation of cardiovascular risk scores

Damen and colleagues (1) present an interesting overview, with recommendations for future practice, of prediction models for cardiovascular disease (CVD) risk. Unfortunately, although they make much of so-called “validation” of these scores in research articles, they say nothing about its relevance to current clinical practice.

In predictive modeling, as reviewed by these authors, historical data are used to predict a known future. Each model produces a risk score on a scale of 0-1 (or 0-100%), but each outcome is either an event or a non-event, so the score cannot ever be “valid”, except in an extreme situation. As in many of the papers reviewed, typically the basic definition of “validation” is stretched to include directional agreement of observed relative frequencies and predicted risks across ordinal categories of predicted risk, but there remains an underlying problem that, when any score is used in clinical practice, we are predicting an unknown future. How can we possibly validate this?

To move to practical issues, I would argue that almost any risk score is invalid, in the sense implied by Deman et al, even when applied contemporarily in the same population from which the data used in the score were derived. A prime reason for this is that the historical data, used for any particular score, were derived in a period when “background” risks were much higher than now: at least 10 years ago if 10-year risks were derived. Hence the score inevitably has built-in obsolescence in that it tends to over-estimate risk. Alternatively, it may be that a score under-estimates within its own parent population, even at a time concurrent with data capture, due to the healthy cohort effect. In theory, these problems may be overridden by exhaustive inclusion of prognostic variables, but this is unlikely to be possible in CVD. So, when considering future clinical practice, external validation is only useful for testing discrimination (avoiding bias from self-testing) and internal validation is only useful for testing calibration (to ensure that the model used fits adequately within its own data).

Denman et al mention GLOBORISK (2) in passing, dismissing this new approach to CVD risk scoring as not adding anything new. I disagree. This is an innovative, pragmatic approach to risk prediction which aims to produce a CVD risk score that is fit to (clinical) purpose, using contemporary data to address the problems of built-in obsolescence and the healthy cohort effect. In addition, it provides a general method to predict CVD risk globally. Importantly GLOBORISK satisfies two important criteria for a new approach to risk scoring, similar to recommendations made by the authors: making better use of available evidence (than have previous risk models) and tailoring (to current needs).

References

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2. Hajifathalian K, Ueda P, Lu Y, Woodward M, Ahmadvand A, Aguilar-Salinas CA, Azizi F, Cifkova R, Di Cesare M, Eriksen L, Farzadfar F, Ikeda N, Khalili D, Khang YH, Lanska V, León-Muñoz L, Magliano D, Msyamboza KP, Oh K, Rodríguez-Artalejo F, Rojas-Martinez R, Shaw JE, Stevens GA, Tolstrup J, Zhou B, Salomon JA, Ezzati M, Danaei G. A novel risk score to predict cardiovascular disease risk in national populations (Globorisk): a pooled analysis of prospective cohorts and health examination surveys. *Lancet Diabetes Endocrinol.* 2015 May;3(5):339-55. doi: 10.1016/S2213-8587(15)00081-9.

Competing interests: I co-designed the GLOBORISK cardiovascular risk score. I am a consultant to Amgen.

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