Risk prediction in theory and practice

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The prediction of cardiovascular (cv) risk has long been a topic of general interest. Based on large epidemiological cohort studies (Framingham, seven-countries, and others) several scores have been developed during the second half of the 20th century. Nowadays “SCORE” and its further elaborate developments promoted by the ESC are probably the most commonly recommended and used tools in clinical practice (1,2,3).

A crude risk prediction is of course possible by using simple qualitative information from a person’s history, without measurements or calculations of any sort. Variables to consider are age, family history, manifest cv disease, tobacco use, overweight and habitual physical exercise.

SCORE is based on some of these variables as well as on additional easily measured items like diabetes, blood lipids, and systolic blood pressure. It thus enables the calculation of a number (such as percent mortality per 10 years) which is more accurate than simply categorizing risk as low, intermediate or high. However, on the individual level overestimation may be common in low-risk situations, and underestimation is possible in higher risk persons. Therefore, a score using more refined criteria is welcome especially in higher risk situations.

When should a cv risk calculation be performed and why should this be useful?
First it may be useful to target preventive measures and recommendations and to show and visualize the difference in cv risk produced by an effective preventive intervention. A word of caution is nevertheless appropriate in this regard: The effect of smoking cessation or regular exercise may easily made visible, but the remaining risk stemming from factors not amenable to change (e.g. age, genetics, diabetes) may be overshadowing a possible reduction and discourage an individual subject from making efforts of change.

Second, cv risk prediction is useful for physicians considering a specific treatment such as lipid lowering medication, or planning a surgical (cv or other) intervention in order to discuss the risks of such an intervention with the patient.

In their study Ballew S (4) et al report the effect of adding measures of renal function (such as estimated GFR and albuminuria) to the traditional SCORE2 variables. The calculations were made in a meta-analysis of a huge data set and seem to be generalizable to at least the European population. The addition of measures of renal function was especially meaningful in higher risk populations, with a regrouping towards a higher risk category in 14% and towards lower risk in 15% of cases. Risk prediction was calculated to be improved by 2-3%.

Recent data from another study show that the inclusion of serum uric acid levels may also improve risk prediction in a lower risk subpopulation (5).

Hence, we will probably be enabled to refine the SCORE2 as well as other risk prediction algorithms by adding some easily available metabolic measurements. This could lead to an even more detailed motivational discussion during risk assessment with the individual needing or seeking this advice. Quantitatively however the refining of risk prediction brought about by more sophisticated measurements is rather marginal when compared to the crude and simple method described initially. Despite the parameters shown to be of additional value, in daily clinical practice we should probably concentrate on the most readily recognizable clinical and anamnestic variables mentioned above to be addressed with the patient on every possible occasion.
References

Estimation of ten-year risk of fatal cardiovascular disease in Europe: the SCORE project
Eur Heart J 2003; 24: 987–1003.


3) SCORE2 Working Group and ESC Cardiovascular Risk Collaboration. SCORE2 risk prediction algorithms: new models to estimate 10-year risk of cardiovascular disease in Europe.
Eur Heart J 2021; 42:2439-2454.

4) Ballew S et al
Including Measures of Chronic Kidney Disease to Improve Cardiovascular Risk Prediction by SCORE2 and SCORE2-OP
EJPC-D-22-00550R3, awaiting publication

5) Moshkovits Y et al
Serum Uric Acid Significantly Improves the Accuracy of Cardiovascular Risk Score Models
EJPC-D-22-01050, submitted to EJPC, 2022, under review