To Estimate or Not to Estimate Cardiovascular Risk? That is the Question

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Is it essential to estimate cardiovascular risk (CR) at the population and individual levels so that primary prevention measures be initiated? Is there is a suitable risk score (RS) for all populations and for our patient in particular? Would it be better to apply combined RS to make therapeutic measures cost-effective? These issues are still relevant to the prediction of CRF in the new century.

In 1961, Dr. William Kannel published the first article on CRF from data of the Framingham cohort, Massachusetts. The collection began in 1948, when the cardiovascular mortality rates in the United States were higher compared with the current mortality rates in Brazil and Europe. The first generation of the cohort included about 14,500 men and women in the fifth decade of life; the second one included children from the initial selection, recruited in 1971, and the third one included 4,095 individuals, started in 2002. An equation was designed using multivariate analysis with age, sex, smoking, systolic blood pressure, total cholesterol and HDL cholesterol to estimate the risk of developing coronary artery disease in 10 years. Composite outcome was angina, cerebrovascular events, peripheral vascular disease and heart failure. Some models, not yet validated, estimated CRF in 30 years or throughout life.

This RS has not been developed or adapted for the Brazilian context and has other limitations such as short term risk assessment, absence of aggravating factors for risk reclassification and other factors that are currently known (body mass index, obesity, ethnicity, socioeconomic factors, family history, presence of comorbidities such as renal disease, physical inactivity and prevalence of cardiovascular disease in different populations). This RS overestimates or underestimates CRF in other populations such as the Brazilian and the European population.

The prevalence of CRF has changed with a range of magnitudes and directions over the past few years, such as reduced smoking and increasing obesity, metabolic syndrome and physical inactivity. Studies aiming to recalibrate these scores for a given population were not enough to improve their performance, although they may better predict the risk for a particular continent like the SCORE designed for the European population.

The SCORE (Systematic Coronary Risk Evaluation) included nearly 205,000 people from 12 European cohort studies distributed in low and high-risk areas for atherosclerotic disease. It estimated risk at 10 years of fatal atherosclerotic event based on standardized outcomes for acute coronary syndrome, stroke and aorta aneurysm using five variables: age, sex, smoking, systolic blood pressure and total cholesterol or the total cholesterol/HDL cholesterol ratio. Its main limitation is that the measuring instruments were not standardized and this score did not include the Brazilian population in the collection and validation of data.

Other CRF scores were designed to minimize the above limitations: ASSIGN (Assessing Cardiovascular Risk to Scottish Intercollegiate Guidelines Network/SIGN to Assign Preventative Treatment), developed in Scotland, which incorporated family history and social status; the Reynolds score derived from 35 variables collected in a clinical trial with about 25,000 health professionals, and included high-sensitivity C-reactive protein and family history of acute myocardial
infarction before 60 years of age; and QRISK2 (QRESEARCH cardiovascular risk algorithm) designed from the data of 1.3 million English people referred to primary health care, which added other variables such as reported ethnicity and comorbidities: type 2 diabetes, treated hypertension, rheumatoid arthritis, renal disease, and atrial fibrillation.

The Global Risk score estimates the risk of myocardial infarction, stroke, peripheral vascular disease and heart failure in 10 years, while the Lifetime Risk estimates the probability of an individual, from the age of 45, to present an ischemic event. The I Brazilian Guideline of cardiovascular prevention recommends the combined use of two scores to improve the prediction of CRF and therefore primary prevention.

The clinical application of a score for CRF prediction should be assessed for its ability to affect therapeutic management and prognosis of individuals. To this end, the score should be assessed at various stages, such as validation in the target population, the incremental information that adds clinical observation, its effect on changing the therapeutic approach and prognosis of patients, in addition to cost-effectiveness. In the evaluation of a risk model, the possibilities of other diagnoses that may interfere with its interpretation and specificity should also be considered.

The cost-effectiveness of cardiovascular disease prevention measures must be supported by multiple complementary strategies, including changes in lifestyle for the population and pharmacological interventions for high-risk patients. Health policy makers should balance the distribution of relevant funds among these areas.

The article “Predictive Value of the Framingham Score in the Identification of High Cardiovascular Risk” assesses the predictive value of the Framingham score and the SCORE to identify patients at high cardiovascular risk. In this context, it is necessary that risk scores be not extrapolated to patients for which they do not apply, that is, these only should be applied to populations that are similar to those that originated the score and should not be used to estimate the CRF of individuals who have had events. The presence of clinical manifestations of atherosclerotic disease or the like, diabetes mellitus or significant chronic kidney disease, will allocate patients at high risk. No other tool is necessary to estimate CRF.

Note that the prediction of cardiovascular events obtained with RS will not modify the established strategies of primary prevention, such as lifestyle changes, blood pressure control, reduction of serum cholesterol levels and regular physical exercising. Only for a small group of individuals, the use of aspirin and statins will be cost-effective.

**Keywords:** Risk management; Cardiovascular diseases; Primary prevention

**Potential Conflicts of Interest**
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