Laboratory-based and office-based risk scores and charts to predict 10-year risk of cardiovascular disease in 182 countries: a pooled analysis of prospective cohorts and health surveys

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Abstract

Background: Worldwide implementation of risk-based cardiovascular disease (CVD) prevention requires risk prediction tools that are contemporarily recalibrated for the target country and can be used where laboratory measurements are unavailable. We present two cardiovascular risk scores, with and without laboratory-based measurements, and the corresponding risk charts for 182 countries to predict 10-year risk of fatal and non-fatal CVD in adults aged 40-74 years. Methods: Based on our previous laboratory-based prediction model (Globorisk), we used data from eight prospective studies to estimate coefficients of the risk equations using proportional hazard regressions. The laboratory-based risk score included age, sex, smoking, blood pressure, diabetes, and total cholesterol; in the non-laboratory (office-based) risk score, we replaced diabetes and total cholesterol with BMI. We recalibrated risk scores for each sex and age group in each country using country-specific mean risk factor levels and CVD rates. We used recalibrated risk scores and data from national surveys (using data from adults aged 40-64 years) to estimate the proportion of the population at different levels of CVD risk for ten countries from different world regions as examples of the information the risk scores provide; we applied a risk threshold for high risk of at least 10% for high-income countries (HICs) and at least 20% for low-income and middle-income countries (LMICs) on the basis of national and international guidelines for CVD prevention. We estimated the proportion of men and women who were similarly categorised as high risk or low risk by the two risk scores. Findings: Predicted risks for the same risk factor profile were generally lower in HICs than in LMICs, with the highest risks in countries in central and southeast Asia and eastern Europe, including China and Russia. In HICs, the proportion of people aged 40-64 years at high risk of CVD ranged from 1% for South Korean women to 42% for Czech men (using a ≥10% risk threshold), and in low-income countries ranged from 2% in Uganda (men and women) to 13% in Iranian men (using a ≥20% risk threshold). More than 80% of adults were similarly classified as low or high risk by the laboratory-based and office-based risk scores. However, the office-based model substantially underestimated the risk among patients with diabetes. Interpretation: Our risk charts provide risk assessment tools that are recalibrated for each country and make the estimation of CVD risk possible without using laboratory-based measurements. Funding: National Institutes of Health..