Scores

Improvement of cardiovascular risk prediction by longitudinal risk factor and competing risk data

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OnBehalf: REGICOR Study

Background: Cardiovascular risk assessment is the cornerstone of cardiovascular primary prevention. However, most of the recommended or regionally validated risk assessment tools are not updated.

Purpose: To analyze the effect of including longitudinal information of risk factors as well as competing risks for cardiovascular risk prediction.

Methods: Data from 10,152 general population individuals from North-Eastern Spain was included. Individuals were recruited in 1995-2000-2005 in three different cohorts of the REGICOR Study. Risk factor data was obtained at baseline and in 2 follow-up visits. Risk factor data included age, sex, education, lipid profile, blood pressure, glucose, smoking, body mass index, and treatment for hypercholesterolemia, hypertension and diabetes. Event data was obtained by cross linkage with healthcare and mortality databases. Cardiovascular events included myocardial infarction, angina and stroke. Cancer mortality and other mortality were included as competing risks. Four cox proportional hazards models developed to model time to coronary/cerebrovascular events with longitudinal or competing risk data. Interactions between age and risk factors were included. Discrimination was assessed with the area under the ROC curve (AUC) and Sommer's D statistic, and compared with discrimination of Framingham-REGICOR function.

Results: The variable with the largest effect on coronary/cerebrovascular event incidence was diabetes treatment in the longitudinal models [Hazard ratio -HR- (95% confidence interval -CI-): 3.02 (2.00, 4.58)/2.58 (1.33, 5.00)] as well as in the competing risk models [HR (95% CI): 3.08 (2.09, 4.55)/2.77 (1.48, 5.18)]. In addition to currently used variables, medication for hypertension and diabetes, and interaction between age and diabetes medication were included in all models. Compared to the Framingham-REGICOR function, discrimination improved with the inclusion of longitudinal or competing risk data as shown in the Table.

Conclusion: Including longitudinal information of cardiovascular risk factors or competing risks improved discrimination of a regionally validated cardiovascular risk function. The availability of these data in healthcare databases would allow its use in primary care cardiovascular risk assessment.

Discrimination analysis

Models	AUC (95% CI) developed models	AUC (95% CI) Framingham-REGICOR function	p-value
Competing risks - coronary events	0.80 (0.77-0.82)	0.74 (0.71-0.77)	< 0.001
Competing risks - cerebrovascular events	0.78 (0.74-0.82)	0.68 (0.63-0.72)	< 0.001
Longitudinal data - coronary events	0.79 (0.78-0.81)	0.76 (0.74-0.78)	< 0.001
Longitudinal data - cerebrovascular events	0.80 (0.78-0.83)	0.71 (0.69-0.74)	< 0.001