The QRISK was less likely to overestimate cardiovascular risk than the Framingham or ASSIGN equations

Hippisley-Cox J, Coupland C, Vinogradova Y, et al. **Derivation and validation of QRISK, a new cardiovascular disease risk score for the United Kingdom: prospective open cohort study.** BMJ. 2007;335:136-47.

Clinical impact ratings: GIM/FP/GP ★★★★★☆☆ Cardiology ★★★★★★☆ Neurology ★★★★☆☆☆

QUESTIONS

In primary care patients in the United Kingdom, does the QRISK score predict risk for cardiovascular (CV) disease? How does it compare with the Framingham and ASSIGN risk models?

METHODS

Design: 2 prospective cohort studies, 1 for derivation and 1 for validation.

Setting: 318 (derivation cohort) and 160 (validation cohort) general practices in England, United Kingdom.

Patients: A cohort of patients 35 to 74 years of age, who did not have diabetes or CV disease and had complete medical records for ≥ 1 year. Exclusion criteria were temporary residence, interrupted registration with practices, and invalid postcode–Townsend scores. 1.28 million patients (50% women) comprised the derivation cohort, and 0.61 million patients (50% women) comprised the validation cohort.

Description of prediction guides: The QRISK score was derived using a Cox proportional hazards model and was weighted based on the log of the hazard ratio for the following CV risk factors: age, sex, smoking status, body mass index, systolic blood pressure, ratio of total to high-density lipoprotein cholesterol levels, Townsend deprivation score, family history of CV disease in a first-degree relative < 60 years of age, and receipt of ≥ 1 antihypertensive drug. {The Framingham equation is based on age, sex, smoking status, blood pressure, ratio of total to high-density lipoprotein cholesterol levels, glucose intolerance, and left ventricular hypertrophy.}* The ASSIGN model had similar variables to the QRISK score but included number of smoked cigarettes/d instead of smoking status and measured deprivation using the Index of Multiple Deprivation.

Outcome: Predicted-to-observed ratios for 10-year CV disease risk.

MAIN RESULTS

In the derivation cohort, the 10-year observed risk for a CV event was 6.7% (95% CI 6.6 to 6.8) in women and 9.5% (CI 9.4 to 9.6) in men. In the validation cohort, the 10-year observed risk for a CV event was 6.6% (CI 6.5 to 6.7) in women and 9.3% (CI 9.1 to 9.4) in men. The predicted-to-observed ratios for overall 10-year CV risk and areas under the receiver-operating characteristic (AUROC) curve for the validation cohort are in the Table. Other statistics (D and R2) favored QRISK over the other 2 models. The QRISK, Framingham, and ASSIGN models overpredicted 10-year CV disease risk by 0.4%, 35%, and 36%, respectively. The QRISK and Framingham models classified 8.5% and 13% of patients in the validation cohort at high (≥ 20%) risk, respectively. 9% of all patients would be reclassified from high to low risk (or vice versa) using the QRISK score compared with the Framingham equation.

CONCLUSION

The QRISK score and Framingham and ASSIGN equations similarly predicted 10-year risk for cardiovascular disease in patients in primary care in the United Kingdom, but QRISK had less overestimation.

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*Anderson KM, Odell PM, Wilson PWF, et al. Am Heart J. 1991;121:293-8.

QRISK, Framingham, and ASSIGN models for predicting overall cardiovascular disease risk in primary care at 10 years (validation cohort)†

Group	QRISK				Framingham				ASSIGN			
	PRED	OBS	P/O ratio	AUROC	PRED	OBS	P/O ratio	AUROC	PRED	OBS	P/O ratio	AUROC
Women	6.3%	6.2%	1.02	0.79	7.3%	6.2%	1.18	0.77	8.5%	6.2%	1.38	0.78
Men	8.9%	8.9%	1.00	0.77	13%	8.8%	1.47	0.76	12%	8.8%	1.35	0.76

†AUROC = area under the receiver-operating characteristic curve; OBS = observed risk; P/O = predicted-to-observed; PRED = predicted risk.

COMMENTARY

With the development of CV prevention guidelines, CV risk models have been increasingly used to target primary preventive strategies for high-risk patients. With the changing epidemiology of CV disease (1), risk prediction based on dated models or historical cohorts may lead to potential inaccuracies. Furthermore, many risk models do not incorporate risk predictors, such as social deprivation and ethnicity, and such omissions may lead to inequalities in risk stratification (2).

The QRISK model was developed in a U.K. population and incorporated risk factors previously excluded from accepted models—family history, social deprivation, body mass index, and hypertension requiring treatment. The derivation and validation study by Hippisley-Cox and colleagues shows the QRISK score to be at least as effective as the Framingham and ASSIGN models (which were based on American and Scottish cohorts, respectively) in predicting 10-year risk for CV events but with better calibration in the U.K. population.

Some limitations should be considered. Although QRISK was validated in a U.K. population, its generalizability to other populations worldwide is unclear. In addition, recruitment was limited to practices using the Egton Medical Information System, and it is unclear whether this model can be applied to other patient databases. Although QRISK was suggested as the better predictive tool, the AUROC curves were similar among QRISK, Framingham, and ASSIGN models. Nonetheless, the results of the study are promising and highlight the importance of updating risk prediction models as the epidemiology of CV disease changes (1, 2). By accurately classifying patients, primary preventive strategies can be optimized and targeted at appropriate risk strata. The results of further studies assessing the validity of QRISK are eagerly awaited.

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References

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