FEATURED CORRESPONDENCE

Advantages of QRISK2 (2010): the key issue is ethnicity and extent of reallocation

To the Editor In their paper published in this issue of Heart (***see page 491***), de la Iglesia *et al*[1] describe the performance of ASSIGN and Framingham algorithms in comparison to the original QRISK equations.

Readers may be interested that the QRISK2 algorithm was published in February 2009[2] and made available as free open source software in April 2010.[3] This can be found at http://svn.clinrisk.co.uk/opensource/qrisk2/. The open source is intended to further increase the reliable and widespread implementation of QRISK2 into clinical practice.

There are substantial differences between the original QRISK[4] and QRISK2[5] algorithms which include additional predictor variables together with their associated significant age interactions:

—self-assigned ethnicity
—rheumatoid arthritis
—chronic renal disease
—atrial fibrillation.

All these are independent predictors and improve risk estimates in individual patients. Both QRISK and QRISK2 have been independently validated on an external cohort.[6 7] The results for QRISK2 showed an improvement compared with the results of the original QRISK equation.[4 5]

We disagree with the conclusion that 'using any of the models for initial systematic assessment of high or lower CVD [cardiovascular disease] risk would result in the majority of men and women to which the models apply getting very similar assessment and hence prioritisation for further investigation of treatment'. The key issue is the extent of reallocation. Allocation is critically dependent on the CVD risk score used and its performance in contemporaneous, ethnically diverse UK populations. The fact that ASSIGN, like Framingham, is associated with 20% or more overestimation in men results from a dependence on historical cohorts from the 1980s when the vascular epidemic was near its peak. Vascular mortality has halved in the succeeding decades and the incorrect allocation of individuals to high-risk categories will increase with the use of ASSIGN and Framingham.

The QRISK2 algorithm is derived from contemporaneous cohorts and is updated annually to take account of population trends in risk factors and disease incidence, improvements in data quality and changing requirements (eg, the need to incorporate a broader age range as in the GP 'QOF' Contract). QRISK2 (2010) has therefore been refitted to the latest version of the QResearch database and includes a broader age range of patients aged 30–84 years.[3] This has resulted in considerable improvements in performance as can be seen from table 1.

Table 1 Validation statistics for QRISK2 (2010) on the QResearch database compared with ASSIGN[1] on The Health Improvement Network database

	Mean (95% CI)	
	QRISK2 (2010) 30–84 years	ASSIGN[1] 35–74 years
Women		
R^2	51.4 (50.9 to 5.19)	37.39 (36.70 to 37.97)
D statistic	2.11 (2.09 to 2.13)	1.58 (1.56 to 1.60)
ROC value	0.853 (0.851 to 0.855)	0.792
Predicted/observed	0.97	1.20
Men		
R^2	45.90 (45.4 to 46.4)	30.47 (29.82 to 31.16)
D statistic	1.89 (1.87 to 1.91)	1.35 (1.33 to 1.37)
ROC value	0.830 (0.828 to 0.833)	0.756
Predicted/observed	0.95	1.20

The table shows measures of the performance of the scores, that is, how accurate the scores are in identifying high-risk patients and distinguishing them from low-risk patients and how much of the 'variation' in risk is explained by the scores themselves. High values for R^2, D statistic and receiver operating characteristic (ROC) indicate better performance than low values. A predicted/observed ratio of 1 indicates perfect calibration and a ratio greater than 1 indicates overprediction.

Systematic use of a cardiovascular risk score which does not include ethnicity is likely to underestimate risk, particularly in South Asians, and also contribute to widening health inequalities.

The inclusion of ethnicity is especially important given the effect of ethnicity on cardiovascular risk. For example, Pakistani men have a 97% increased risk of CVD compared with white men (adjusted HR 1.97, 95% CI 1.70 to 2.29). Using a 20% threshold to define high risk, 15% of South Asian men would be identified as high risk using QRISK2 (2010) compared with 10% using the NICE modified version of Framingham. Similarly, 8% of South Asian women would be identified as high risk using QRISK2 (2010) compared with 3% based on Framingham.

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Competing interests JH-C is professor of clinical epidemiology at the University of Nottingham and co-director of QResearch®—a not-for-profit organisation which is a joint partnership between the University of Nottingham and EMIS (a leading commercial supplier of IT for 60% of general practices in the UK). JH-C is also director of ClinRisk Ltd which produces open and closed source software to ensure the reliable and updatable implementation of clinical risk algorithms within clinical computer systems to help improve patient care. CC is associate professor of medical statistics at the University of Nottingham and a consultant statistician for ClinRisk Ltd. JR and PB have received no financial support for undertaking this work. JR and PB were previously members of the NICE Guideline Development Group for Lipid Modification of which JR was chair. This work and any views expressed within it are solely those of the co-authors and not of any affiliated bodies or organisations. There are no other relationships or activities that could appear to have influenced the submitted work.

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The Authors' reply Hippisley-Cox *et al*'s response[1] to our paper published in this issue of *Heart*[2] highlights differences between QRISK[3] and QRISK2[4] asserting that QRISK2 improved on QRISK whereas an independent validation concluded that 'differences in performance were marginal'.[5] The wider CIs obtained in the independent validation of QRISK2 († in table 1) by incorporating multiple imputation indicate little difference between the scores, once uncertainty is taken into account.

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