

## **Performance of the UK Prospective Diabetes Study Risk Engine and the Framingham Risk Equations in Estimating Cardiovascular Disease in the EPIC-Norfolk Cohort**

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### Abstract

**OBJECTIVE** The purpose of this study was to examine the performance of the UK Prospective Diabetes Study (UKPDS) Risk Engine (version 3) and the Framingham risk equations (2008) in estimating cardiovascular disease (CVD) incidence in three populations: 1) individuals with known diabetes; 2) individuals with nondiabetic hyperglycemia, defined as A1C  $\geq$ 6.0%; and 3) individuals with normoglycemia defined as A1C <6.0%.

**RESEARCH DESIGN AND METHODS** This was a population-based prospective cohort (European Prospective Investigation of Cancer-Norfolk). Participants aged 40–79 years recruited from U.K. general practices attended a health examination (1993–1998) and were followed for CVD events/death until April 2007. CVD risk estimates were calculated for 10,137 individuals.

**RESULTS** Over 10.1 years, there were 69 CVD events in the diabetes group (25.4%), 160 in the hyperglycemia group (17.7%), and 732 in the normoglycemia group (8.2%). Estimated CVD 10-year risk in the diabetes group was 33 and 37% using the UKPDS and Framingham equations, respectively. In the hyperglycemia group, estimated CVD risks were 31 and 22%, respectively, and for the normoglycemia group risks were 20 and 14%, respectively. There were no significant differences in the ability of the risk equations to discriminate between individuals at different risk of CVD events in each subgroup; both equations overestimated CVD risk. The Framingham equations performed better in the hyperglycemia and normoglycemia groups as they did not overestimate risk as much as the UKPDS Risk Engine, and they classified more participants correctly.

**CONCLUSIONS** Both the UKPDS Risk Engine and Framingham risk equations were moderately effective at ranking individuals and are therefore suitable for resource prioritization. However, both overestimated true risk, which is important when one is using scores to communicate prognostic information to individuals.