

DIABETES

Pencil-and-paper risk-scoring systems for the prediction of incident diabetes

A US study group successfully used a basic risk-scoring system to identify individuals at high risk of type 2 diabetes mellitus (T2DM), while the additional inclusion of blood-test results identified those at extremely high risk of the disease. A major advantage of both systems is their simplicity. “Once the user has collected the simple data necessary for a risk score it isn’t necessary to have a computer to estimate future diabetes risk,” explains Henry S. Kahn (Centers for Disease Control and Prevention, Atlanta, GA), lead investigator of the study.

Various studies have shown that appropriate intervention programs can prevent or delay the onset of T2DM in those who are at high risk of developing the disease. As these intervention programs are usually costly, health-care providers need simple systems that can inexpensively identify the individuals who are in greatest need of such programs. Kahn and colleagues, therefore, developed ‘pencil-and-paper’ risk-prediction systems that might be considered in place of the 2 h oral glucose tolerance test, which is the traditional method to identify high-risk candidates for enrollment in diabetes prevention programs.

The investigators analyzed data of the Atherosclerosis Risk in Communities

(ARIC) study, which included 12,729 adults (age 45–64 years at enrollment) who did not have diabetes mellitus at baseline from four communities in the US and followed them for 14.9 years. Although the primary focus of the ARIC study was the prevention of cardiovascular disease, it also included information about incident T2DM, serum glucose measurements approximately every 3 years and a 2 h oral glucose tolerance test at year 9.

Using a randomly selected 75% of the ARIC study’s baseline sample, Kahn and colleagues developed two models to evaluate the relationships between risk factors and the incidence of T2DM. The basic model included anthropometric measures, family history, blood pressure and pulse, whereas the enhanced model included the same measures plus fasting levels of glucose, triglycerides, HDL cholesterol and uric acid. In both models, the contribution of each factor to the total risk was expressed as simplified and standardized integer points (the maximal total scores were 100). The remaining 25% of the ARIC sample was reserved for an independent validation of the risk-scoring systems, which confirmed their utility. Using the basic model, ascending quintiles were associated with a 10-year risk of

incident T2DM of 5.3%, 8.7%, 15.5%, 24.5% and 33.0%, respectively, whereas in the enhanced model, ascending quintiles were associated with a risk of 3.5%, 6.4%, 11.5%, 19.3% and 46.1%, respectively.

The predictive models were designed in ways that would be simplest and most informative for the users. “From our assignments of integer points it becomes clear, for example, that having a diabetic mother probably confers greater risk than does being black,” Kahn says. Furthermore, the scoring systems did not include risk factors in a form that depended on ratios, such as BMI or other compound indices. Thus, the user can recognize any separate role that is played by independent factors such as weight or height. “We learned that if the waist circumference and height are participating in the predictive model then body weight contributes very little (or nothing) to the risk of diabetes,” Kahn explains.

Notably, this study only included data that had been recorded in the ARIC study, and so might have omitted some relevant data, such as a history of gestational diabetes mellitus, exposure to persistent organic pollutants, and low levels of circulating vitamin D or sex-hormone-binding globulin, all of which potentially increase the risk of incident T2DM.

“Beyond these risks defined in biomedical terms, our group remains interested in the mechanisms by which social, psychological and economic factors contribute to the likelihood of future cardiometabolic disease. We hope to develop strategies that will facilitate the use of risk-scoring systems in programs aimed at reducing the long-term burden of diabetes,” concludes Kahn.

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