Cost-effectiveness of risk stratification for preventing type 2 diabetes using a multi-marker diabetes risk score

Sullivan SD, Garrison LP, Rinde H, Kolberg J, Moler EJ

Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

CRD summary
The objective was to assess the cost-effectiveness of strategies to identify those at risk of developing type 2 diabetes. The authors concluded that the cost-effectiveness of diabetes prevention could be improved by identifying those at highest risk, using the Diabetes Risk Score. The study methods were adequate and the results were reported fully. It was unclear if all the relevant evidence was included in the model, but it is likely that the authors’ conclusions are valid.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to assess the cost-effectiveness of strategies to identify those at risk of developing type 2 diabetes.

Interventions
Three options were compared: testing, testing plus Diabetes Risk Score (DRS), and no screening. Testing used fasting plasma glucose to identify those with impaired fasting glucose, who were then placed on a diabetes prevention and surveillance programme. The PreDx DRS was a multi-marker risk assessment tool for identifying those at the highest risk of developing diabetes.

Location/setting
USA/primary care.

Methods
Analytical approach:
A Markov model was used to assess the costs and outcomes of the three options. The time horizons were five and 10 years. The authors reported that the perspective was that of the US health care payer.

Effectiveness data:
The clinical and effectiveness data were from published studies. The main parameter of effectiveness was the five-year risk of diabetes in those with impaired fasting glucose, with or without a high DRS. These estimates were from a Danish study, called the Inter99 cohort study (Kolberg, et al. 2009, see 'Other Publications of Related Interest' below for bibliographic details).

Monetary benefit and utility valuations:
The utility values for non-diabetic patients, patients with new diabetic symptoms, and clinically diagnosed diabetic patients were from published studies.

Measure of benefit:
The measure of benefit was quality-adjusted life-years (QALYs) gained. Future benefits were discounted at an annual rate of 3%.

Cost data:
The direct costs were those of initial test; primary care visits; diabetes prevention and surveillance (including yearly tests and primary care visits); diabetes drugs; and the treatment of diabetic complications. The primary care costs were
from Medicare reimbursement rates, and the costs of treating complications were from published studies. The price year was 2007. All costs were reported in US $ and future costs were discounted at an annual rate of 3%.

Analysis of uncertainty:
One-way sensitivity analyses were undertaken to evaluate the effect of parameter uncertainty on the outcomes. Those variables accounting for 90% of the total range of the incremental cost-effectiveness ratio, for testing plus DRS, were varied in a probabilistic sensitivity analysis, using 1,000 Monte Carlo simulations.

Results
Over five years, the average cost per patient was $25,537 with no screening; $25,607 with testing plus DRS; and $27,519 with testing alone. The average QALYs gained were 3.54 with no screening; 3.55 with testing plus DRS; and 3.55 with testing alone.

Compared with no screening, testing plus DRS had an incremental cost-utility ratio of $17,400 per QALY gained, and testing alone had an incremental cost per QALY gained of $235,500.

Over 10 years, compared with no screening, testing alone had an incremental cost-utility ratio of $94,600 per QALY gained, and testing plus DRS was dominant, as it was less costly and more effective.

The probabilistic sensitivity analysis showed that at a willingness-to-pay threshold of $18,000 per QALY gained, over five years, testing plus DRS was cost-effective in 50% of simulations.

Authors’ conclusions
The authors concluded that the cost-effectiveness of diabetes prevention could be improved by identifying patients at the highest risk of diabetes using the DRS.

CRD commentary
Interventions:
The screening options were described and the usual practice appears to have been included.

Effectiveness/benefits:
The clinical and effectiveness data were from published studies. No systematic review of the literature was reported and it is unclear whether all the relevant information was analysed. The main measure of effectiveness was from a non-US cohort study. The authors acknowledged that this was a limitation to their study, as the results from Danish patients might not be generalisable to the US population.

Costs:
The perspective was explicitly reported to be that of the US payer. All the cost categories relevant to this perspective were included and it appears that all the major relevant costs were included. The sources for the costs were reported, as were the price year, time horizon, discount rate and currency.

Analysis and results:
A Markov model was used to synthesise the cost and outcome information. Appropriate details were provided including a diagram. Uncertainty in the model was tested in one-way and probabilistic sensitivity analyses. As a limitation to their study, the authors reported that other risk assessment tools were available, but were not investigated in this study.

Concluding remarks:
The study methods were adequate and the results were reported fully. It was unclear if all the relevant evidence was included in the model, but it is likely that the authors’ conclusions are valid.

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