Cost-effectiveness of screening for pre-diabetes among overweight and obese US adults

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 aim was to assess the cost-effectiveness of implementing a routine screening programme, for pre-diabetes in overweight and obese individuals, in comparison with no screening. The authors concluded that screening for pre-diabetes in this US population, followed, if positive, by a change in lifestyle based on the Diabetes Prevention Program, was cost-effective from the perspective of the health care system. The study was well conducted and generally well reported. The authors’ conclusions appear to be valid.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to assess the cost-effectiveness of implementing a routine screening programme in overweight and obese adults aged 45 to 74 years, for pre-diabetes, compared with no screening.

Interventions
The screening programme was compared with the current approach of no screening. If screening was positive, two diagnostic tests were used for confirmation, and a change in lifestyle based on the Diabetes Prevention Program (DPP) was implemented.

Two strategies were analysed. In strategy one, overweight patients were given the lifestyle intervention, if they screened positive and were then diagnosed with both impaired glucose tolerance (IGT) and impaired fasting glucose (IFG). In strategy two, participants were given the lifestyle intervention, if they screened positive and were diagnosed with either IGT or IFG or both.

Location/setting
USA/primary care.

Methods
Analytical approach:
This economic evaluation was based on a simulation model with three modules, a screening module, a pre-diabetes module, and a diabetes module. The diabetes module was based on a Markov model that simulated disease progression. The time horizon was not clearly stated but appears to have been lifetime. The authors reported that the perspective was that of the health care system.

Effectiveness data:
The clinical data were derived from a selection of known, relevant studies. For example, the characteristics of the population and several epidemiological inputs were derived from the National Health and Nutritional Examination Survey. Data on the efficacy of the DPP were from the DPP Research Group. The transition probabilities for the diabetes module were from the UK Prospective Diabetes Study.

Monetary benefit and utility valuations:
The utility valuations were derived from published sources, including the DPP Research Group. No other details were provided.
Measure of benefit:
Quality-adjusted life-year (QALY)s were used as the summary benefit measure. These were discounted at an annual rate of 3%. Life-year (LY)s were also reported but were not combined with costs.

Cost data:
The health service costs were screening test (blood drawn and physician time), the two diagnostic tests (for IFG or IGT or both), participation in the DPP lifestyle intervention, and long-term treatment of diabetes. The resource use appears to have been defined by the authors and supplemented with data from published sources. The costs of screening and tests were derived from Medicare reimbursement rates. The cost of lifestyle modification was obtained from the direct analyses of the DPP model. Diabetes costs were based on published studies. All costs were in US dollars ($), future costs were discounted at an annual rate of 3%, and the price year was 2001.

Analysis of uncertainty:
Several univariate sensitivity analyses were carried out to explore alternative scenarios of prevalence rates and age-groups. A societal perspective was considered by including indirect costs such as patient time, food and transportation. Repeated screening strategies and different types of programme were also investigated.

Results
The total cost per person was $16,550 with no screening, $18,879 with strategy one, and $17,672 with strategy two. The discounted QALYs were 8.910 with no screening, 9.009 with strategy one and 9.200 with strategy two. The undiscounted LYs were 18.705 with no screening, 18.811 with strategy one and 19.005 with strategy two.

In comparison with no screening, the incremental cost per QALY gained was $8,181 with strategy one and $9,511 with strategy two. The incremental cost per QALY gained with strategy two over strategy one was $10,167.

The sensitivity analysis corroborated the base-case findings and showed that intervention-related parameters were the most influential model inputs. However, both strategies always remained cost-effective compared with no screening. The incremental cost per QALY gained in comparison with no screening ranged from dominant (both more effective and less expensive) to $19,422 with strategy one and from $267 to $20,161 with strategy two.

Authors' conclusions
The authors concluded that screening for pre-diabetes in the overweight and obese US population aged 45 to 74 years was cost-effective from the perspective of the health care system.

CRD commentary
Interventions:
The selection of no intervention as the background comparator for both screening strategies was appropriate as no screening was the actual pattern of care in the authors’ setting.

Effectiveness/benefits:
The approach used to derive the clinical data was based on the selection of sources which were deemed to be the most appropriate for the economic evaluation. Thus, despite the lack of a systematic approach, the sources used were valid and reflected not only the epidemiologic setting, but also the implementation of interventions such as the DPP. Little information on the derivation of the utility valuations and the subsequent calculation of QALYs was provided, because they were based on a published model. QALYs are an appropriate benefit measure and capture the impact of the interventions on both quality and length of life.

Costs:
The analysis of costs was consistent with the perspective. The authors also considered a societal perspective by including costs borne by patients or other payers. The findings were robust to these changes in assumptions. The costs were presented as macro categories, making it difficult to determine the details of the types of costs included in each category. Furthermore, the sources used to derive the economic inputs for the model were only partially described. These aspects of the cost analysis reduce the transparency of the study. The cost estimates were treated deterministically. The price year was reported which will facilitate reflation exercises for other time periods.
Analysis and results:
The synthesis of costs and benefits was appropriately carried out and presented. The issue of uncertainty was addressed in the sensitivity analyses, which not only focused on individual model inputs, but also considered alternative target populations and scenarios. The findings of the sensitivity analysis were clearly reported and discussed. The issue of the generalisability of the results was not explicitly addressed.

Concluding remarks:
The study was well conducted and generally well reported. The authors’ conclusions appear to be valid.

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