Screening for gestational diabetes mellitus: are the criteria proposed by the International Association of the Diabetes and Pregnancy Study Groups cost-effective?

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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
This study examined the cost-effectiveness of criteria for the diagnosis of gestational diabetes mellitus, as proposed by the International Association of the Diabetes and Pregnancy Study Groups (IADPSG), compared with usual screening. The authors concluded that the IADPSG strategy was cost-effective, as long as the gestational diabetes diagnosis was followed by intensive intervention to prevent diabetes. The cost-effectiveness framework was valid, the sources were robust, and key areas of uncertainty were addressed. The authors' conclusions are robust.

Type of economic evaluation
Cost-utility analysis

Study objective
This study examined the cost-effectiveness of the introduction of criteria for the diagnosis of gestational diabetes mellitus that were proposed by the International Association of the Diabetes and Pregnancy Study Groups (IADPSG), compared with conventional screening.

Interventions
Three strategies were compared: no screening, usual screening, and IADPSG screening. Usual screening was a one-hour 50g glucose challenge test between 24 and 28 weeks gestation, followed by a three-hour 100g glucose tolerance test for those who tested positive. IADPSG screening was a fasting glucose test at the first prenatal visit, followed by a two-hour 75g glucose tolerance test between 24 and 28 weeks gestation for those who tested positive.

Location/setting
USA/primary care.

Methods
Analytical approach:
The analysis was based on a decision tree for a hypothetical cohort of 100,000 pregnant women, over their lifetime. The authors stated that the perspective of the health care system was adopted.

Effectiveness data:
PubMed was searched to identify the sources for the model inputs. The estimates were from various types of study, including by preference meta-analyses, randomised trials, and prospective cohort studies, but retrospective cohorts, expert opinion, and data from the authors' institution were required. No randomised trials were found for the impact of the screening guidelines, and prospective studies were generally used for the effects of diabetes interventions. The probabilities of maternal and neonatal complications due to gestational diabetes were the key inputs for the model.

Monetary benefit and utility valuations:
The utility values for neonatal death, permanent brachial plexus injury, pre-term birth, and maternal diabetes were from published literature.

Measure of benefit:
Quality-adjusted life-years (QALYs) were the summary benefit measure and they were discounted at an annual rate of 3%.
Cost data:
The economic analysis included the costs of screening, management of diabetes, and pregnancy complications (pre-term labour admissions, pre-eclampsia, shoulder dystocia, brachial plexus injury, and intensive care admissions). The unit costs and quantities of resources were from published literature or the authors' institution; some data were from Medicaid reimbursement tariffs. All costs were in US $ and the price year was 2011. A 3% annual discount rate was applied.

Analysis of uncertainty:
One-way sensitivity analyses were carried out by varying the model inputs over plausible ranges of values. A Monte Carlo simulation was performed, with 10,000 trials, to assess the stability of the model outcomes.

Results
In the main analysis (100,000 pregnant women), the expected QALYs were 5,563,323 with no screening, 5,565,646 with usual screening, and 5,571,824 with IADPSG screening. The costs were $831,622,028 with no screening, $870,390,167 with usual screening, and $996,023,993 with IADPSG screening.

The incremental cost per QALY gained was $16,689 with usual screening over no screening, $19,339 with IADPSG screening over no screening, and $20,336 with IADPSG screening over usual screening.

In an alternative scenario in which only the perinatal outcomes were considered (excluding long-term maternal benefits), neither screening strategy was cost-effective compared with no screening ($543,119 per QALY with usual screening and $565,407 per QALY with IADPSG screening).

In the univariate sensitivity analysis, the model outcomes were generally robust. The most influential input was the probability that long-term behavioural intervention, for those with gestational diabetes identified by IADPSG screening, prevented their progression to diabetes (long-term maternal benefits).

In the Monte Carlo simulation, the IADPSG strategy was cost-effective in 96.4% of cases at a cost-effectiveness threshold of $100,000 per QALY, but it was never cost saving.

Authors' conclusions
The authors concluded that the IADPSG strategy was cost-effective, as long as the gestational diabetes diagnosis was followed by intensive intervention to prevent diabetes.

CRD commentary
Interventions:
The selection of the comparators was appropriate and reflected possible strategies for the identification of gestational diabetes. A clear description of the two screening options was provided and they were compared with no screening.

Effectiveness/benefits:
An appropriate literature search was used to identify the relevant sources of evidence. The evidence for the treatment effect was from clinical trials, which are generally considered to be valid sources, but the data for the screening guidelines were from studies of lower quality. The clinical inputs were varied in the sensitivity analysis. QALYs were an appropriate benefit measure, given the impact of diabetes on survival and quality of life. Both maternal and neonatal outcomes were considered, but the scenario analysis revealed that the long-term maternal benefits were crucial for the cost-effectiveness of screening. The sources for the utility weights were not fully described.

Costs:
The cost categories appear to have been consistent with the perspective. The unit costs and quantities of resources were not reported and most of the data were presented as category totals. Limited information on the data sources was given, but they appear to have been relevant to the authors' setting. The price year was explicitly reported, allowing reflation exercises. The impact of variations in the cost estimates was tested in the sensitivity analyses.

Analysis and results:
The costs and benefits were appropriately synthesised, using an incremental approach, and the results were clearly
stated. Deterministic and probabilistic sensitivity analyses were conducted, varying individual and multiple inputs. These analyses confirmed that the main results were robust. Conventional discounting was applied to the model outcomes. The authors acknowledged some limitations to their analysis, which were mainly due to the lack of good long-term data and the need for assumptions. The findings were specific to the authors’ setting, but might be transferable to settings with similar clinical practice and epidemiology.

Concluding remarks:
The cost-effectiveness framework was valid, the sources were robust, and key areas of uncertainty were addressed. The authors’ conclusions are robust.

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