The cost-effectiveness of gestational diabetes screening including prevention of type 2 diabetes: application of a new model in India and Israel


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 screening for gestational diabetes mellitus and treatment to reduce perinatal complications and diabetes in women in India and Israel. The authors concluded that screening and treatment was highly cost-effective in each setting, by World Health Organization standards. There were reporting limitations, the analysis relied on a strong assumption of perfect screening accuracy, and it was unclear if the comparator was appropriate. The authors’ conclusions should be used with caution.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to assess the cost-effectiveness of screening for gestational diabetes mellitus to prevent type 2 diabetes in women, in India and Israel, and to reduce perinatal complications.

Interventions
The intervention was screening for diabetes, followed by pharmaceutical and behavioural interventions to reduce perinatal adverse events and long-term type 2 diabetes. It was assumed that gestational screening was conducted using the 75g two-hour oral glucose tolerance test. Treatment was metformin or lifestyle management, or both for diabetes, and antenatal interventions for perinatal adverse events. The comparator was no gestational diabetes screening.

Location/setting
India and Israel/secondary care.

Methods
Analytical approach:
A published decision analysis model was used to assess the cost-effectiveness of the intervention for a cohort of 1,000 women, in two settings with contrasting epidemiology and costs. For India, a general medical facility was considered, and for Israel, a large health management organisation was considered, consisting of 14 hospitals and 1,300 primary and special care clinics. The perspective was not reported.

Effectiveness data:
The key effectiveness data were the sensitivity and specificity of the screening test, and the effectiveness of the treatments in reducing perinatal adverse events and type 2 diabetes. The 75g two-hour oral glucose tolerance test was considered to be the gold standard, with 100% sensitivity and specificity. The effectiveness of antenatal interventions in reducing perinatal adverse events was from published literature. The reduction in diabetes due to postpartum lifestyle management and metformin was estimated from Indian and US diabetes prevention programmes.

Monetary benefit and utility valuations:
The effect of the screening strategy on disability-adjusted life-years (DALYs) was based on the reduction in perinatal adverse events and type 2 diabetes. The DALYs for perinatal adverse events were estimated from published data on health state utilities. Those for diabetes cases were estimated using the Center for Outcomes Research (CORE) Diabetes Model, a web-based interactive simulation, using an all-female version of the UK Prospective Diabetes Study cohort.
Measure of benefit:
The health benefit was measured by the reduction in DALYs.

Cost data:
The evaluation included the costs of screening, antenatal care, postpartum care, and the treatment of perinatal adverse events and type 2 diabetes. For India, screening, antenatal and postpartum care were from the general medical facility providing care for women referred with gestational diabetes, and adverse event costs were from personal communications. For Israel, gestational diabetes and adverse event costs were from the organisation's central cost database. Type 2 diabetes costs for both settings were from published literature and a US and Canadian model. All costs were reported in 2011 International dollars (INT$), using purchasing power parity to adjust the unit costs of specified services, and per capita medical care spending to adjust general medical care costs. Costs were discounted at 3% per year.

Analysis of uncertainty:
One-way and multivariate sensitivity analyses were conducted to assess the impact of uncertainty around 16 key variables on the results. Values were varied from 50% to 150% of the initial input. Monte Carlo simulation was conducted to estimate a 90% confidence interval around the incremental cost-effectiveness ratio (ICER).

Results
The authors used World Health Organization cost-effectiveness thresholds, based on the gross domestic product of each country. The intervention was considered highly cost-effective if its ICER was less than INT$ 3,500 for India or INT$ 29,800 for Israel.

The screening and treatment intervention was estimated to cost INT$ 259,139 per 1,000 pregnant women in India and INT$ 259,920 per 1,000 pregnant women in Israel. The net incremental costs compared with no screening and treatment were INT$ 194,358 in India and INT$ 76,102 in Israel.

Compared with no screening, the intervention was estimated to avert 120 DALYs in India and 42 DALYs in Israel. The ICER, compared with no screening, was INT$ 1,626 per DALY averted in India, and INT$ 1,830 per DALY averted in Israel.

The sensitivity analyses indicated that the results were sensitive to variations in the costs and effectiveness of postpartum care, the sensitivity and specificity of the test, and the incidence of diabetes, but the ICER generally remained low.

The Monte Carlo simulations produced a confidence interval of INT$ 543 to 3,957 per DALY averted for India, and net savings of INT$ 1,269 to a cost of INT$ 8,039 per DALY averted for Israel.

Authors’ conclusions
The authors concluded that screening and treatment for gestational diabetes was highly cost-effective, in both Indian and Israeli settings, by World Health Organization standards.

CRD commentary
Interventions:
The screening test was clearly stated, but only limited details of the treatments, care pathways and services provided in each setting were reported. The authors assumed that the 75g two-hour oral glucose tolerance test was used in both settings, but in Israel an alternative test was also used; the impact of this assumption is unclear as no details of the cost and effectiveness of the alternative test were reported. It was unclear if no screening was the standard care in the two settings; for accurate cost-effectiveness results new strategies should be compared with standard care.

Effectiveness/benefits:
The validity of the assumption of perfect sensitivity and specificity for the oral glucose tolerance test is unclear; no evidence was supplied to support this assumption. Since this was a key driver in the sensitivity analysis, its validity should be considered carefully. Few details of the sources for the effectiveness of the treatments in reducing perinatal adverse events and diabetes were reported; it was unclear if these sources were the best available evidence. Only limited
details of the methods used to derive the DALYs were reported, which makes it difficult to assess the validity of these estimates. It was not clear if the use of diabetes-related DALYs from UK patients was appropriate. Future DALYs were discounted, but the rate was not reported.

Costs:
The cost categories and results were clearly reported. From the cost categories, it appears that a health service provider perspective was adopted. The resource use was not reported, which reduces the transparency and replicability of the analysis. Most of the sources for the costs appear to have been appropriate and were specific to each setting.

Analysis and results:
The results of the analysis were clearly reported and appropriate sensitivity analyses were conducted. The time horizon was not stated, making it unclear over what period the costs and benefits were accrued. The authors suggested that the intervention might be cost-effective in diverse settings, given the large differences between the two countries in diabetes prevalence and costs. However they also reported that an earlier economic evaluation, conducted in a US cohort, found that gestational diabetes screening cost US $20,326 per QALY gained, which is significantly higher than the results reported here. Given the specificity of the cost data to each setting and the lack of information on the resource use and usual practice, caution should be used when generalising the results to other settings.

Concluding remarks:
There were limitations in the reporting, particularly for the time horizon, the treatments and the care pathways. The analysis relied on a strong assumption of perfect screening accuracy and it was unclear if no screening was the most appropriate comparator. The authors' conclusions should be used with caution.

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