Treating mild gestational diabetes mellitus: a cost-effectiveness analysis

Ohno MS, Sparks TN, Cheng YW, Caughey AB

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 treatment for mild gestational diabetes mellitus, from a societal perspective. The authors concluded that treatment for mild gestational diabetes improved both maternal and neonatal outcomes and was cost-effective. The cost-effectiveness framework was valid and the authors' conclusions appear to be robust, but more detail on the data sources would have been useful.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to assess the cost-effectiveness of treatment for mild gestational diabetes mellitus.

Interventions
Treatment consisted of nutritional counselling, diet therapy, and insulin if required. This was compared with no treatment, which was the usual prenatal care.

Location/setting
USA/primary and secondary care.

Methods
Analytical approach:
The analysis was based on a decision-tree model that included both maternal outcomes (pre-eclampsia, shoulder dystocia, caesarean delivery, and maternal death) and neonatal outcomes (macrosomia, permanent or transient brachial plexus injury, hypoglycaemia, admission to a neonatal intensive care unit, hyperbilirubinaemia, and neonatal death). A lifetime horizon for both mothers and newborns was considered. The authors stated that the analysis was carried out from a societal perspective.

Effectiveness data:
The clinical inputs were from a selection of relevant studies. The rates of maternal and neonatal complications were the key inputs for the model. The treatment effect was from a multicentre randomised controlled trial, which provided most of the clinical inputs.

Monetary benefit and utility valuations:
The utility values were from the literature or, where none were available, conservative assumptions were used.

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 treating gestational diabetes (pharmacotherapy, antenatal visits, extra diabetes-related visits, and antepartum foetal surveillance) and the costs of maternal and neonatal complications. These data were from published US sources. All costs were in US dollars ($) and the price year was 2009.

Analysis of uncertainty:
One-way sensitivity analyses were carried out on all the inputs using published ranges of values or ranges defined by the authors. Two-way sensitivity analyses were performed on selected inputs. The efficacy of treatment was introduced and varied in a sensitivity analysis. A Monte Carlo simulation was used to simultaneously vary all the inputs across conventional probability distributions. Cost-effectiveness acceptability curves were generated for a maximum societal willingness to pay (WTP) of $100,000 per QALY gained.

Results

Compared with no treatment, treatment reduced the incidence of all maternal and neonatal negative outcomes.

The expected costs were $12,167 with no treatment, and $12,623 with treatment. The QALYs were 56.868753 with no treatment, and 56.891002 with treatment. The incremental cost per QALY gained with treatment over no treatment was $20,412.

These results were robust to the variations considered in the deterministic analysis. Only a high estimate for the cost of gestational diabetes treatment reduced the cost-effectiveness of treatment. Up to a cost of $1,330 ($1,786 in the base case), treatment was dominant as it was more effective and less expensive; between a cost of $1,330 and $3,555, treatment was cost-effective (under $100,000 per QALY); above a cost of $3,555, treatment was not cost-effective.

At the threshold of $100,000 per QALY, the treatment was cost-effective in 70% of the Monte Carlo simulations.

Authors’ conclusions

The authors concluded that treatment for mild gestational diabetes improved both maternal and neonatal outcomes and was cost-effective.

CRD commentary

Interventions:

The selection of the comparators was appropriate as the proposed intervention was compared against usual care. The key components of treatment were described.

Effectiveness/benefits:

No systematic literature review to identify the relevant sources of evidence was reported. The treatment effect was mainly from a recent multicentre randomised controlled trial that was not fully described, but should have had good internal validity. Another trial was used for the sensitivity analysis. The authors did not describe the sources for the other clinical inputs, which limits the possibility of objectively assessing their validity, but they were extensively varied in the sensitivity analyses. Issues related to the use of data from multiple and potentially differing sources were not investigated. QALYs were an appropriate benefit measure for capturing the impact of the interventions on survival and quality of life of both the mothers and newborns. Most of the utility values were from published sources, but the methods used to derive them (which instruments and whose preferences) were not described.

Costs:

A wide range of costs was analysed and they were consistent with the societal perspective. Neither productivity losses nor the costs of antenatal admissions and emergency room visits were included, since these data were not available from the trials. This was acknowledged as a possible limitation. The costs were presented as category totals and were not broken down into individual items, reducing the transparency of the analysis. The methods of the data sources were not clearly described. The price year was reported, facilitating reflation exercises for other time periods. Alternative cost estimates were considered in the sensitivity analyses.

Analysis and results:

The results were extensively presented. An incremental approach was used to synthesise the costs and benefits of the two strategies. Valid approaches were used to assess the uncertainty and the results were clearly presented and discussed. The authors stated that this was the first economic evaluation of gestational diabetes treatment. The findings should be considered specific to the authors’ setting and the transferability of the results was not discussed, but an extensive sensitivity analysis was conducted. The authors stated that there was uncertainty around many of the model parameters and that the expected value of perfect information would have been very high.
Concluding remarks:
The cost-effectiveness framework was valid and the authors’ conclusions appear to be robust, but more detail on the data sources would have been useful.

Funding
Funding received from the Eunice Kennedy Shriver National Institute of Child Heath and Human Development, USA.

Bibliographic details

PubMedID
22071065

DOI
10.1016/j.ajog.2011.06.051

Original Paper URL
http://www.ajog.org/article/S0002-9378(11)00786-1/abstract

Indexing Status
Subject indexing assigned by NLM

MeSH
Adult; Cesarean Section /economics; Cost-Benefit Analysis; Decision Support Techniques; Diabetes, Gestational /drug therapy /economics; Dystocia /economics; Female; Health Care Costs; Humans; Pregnancy; Quality-Adjusted Life Years; Severity of Illness Index

AccessionNumber
22011001600

Date bibliographic record published
09/11/2011

Date abstract record published
07/02/2012