Economic assessment of screening for pre-eclampsia

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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 first-trimester routine screening for pre-eclampsia, compared with standard prenatal care, from a health care payer perspective. The authors concluded that routine screening for pre-eclampsia was cost-effective in various scenarios. The analysis of uncertainty focused on selected inputs for the model, but the cost-effectiveness framework was robust and the authors’ conclusions appear to be valid.

Type of economic evaluation
Cost-effectiveness analysis, cost-utility analysis

Study objective
This study examined the cost-effectiveness of first-trimester routine screening for pre-eclampsia, compared with standard prenatal care.

Interventions
First-trimester routine screening for pre-eclampsia, using placental markers (placental protein 13 and placental growth factor) and uterine artery Doppler pulsatility index, was compared with no screening. Women who tested positive and those with risk factors (with or without screening) received more frequent doctor visits and preventive measures.

Location/setting
Israel/secondary care.

Methods
Analytical approach:
The analysis was based on a decision tree. A short-term horizon that covered the hospitalisation period until discharge was used for the cost-effectiveness analysis, and a 30-year time horizon that covered the survival of the offspring was used for the cost-utility analysis. The authors stated that the analysis took the perspective of the payer.

Effectiveness data:
Most of the epidemiological inputs were from a large pregnancy database, containing records of 14,500 births over four years, of the major health maintenance organisations in Israel. Other data were from the Central Bureau of Statistics. The treatment effect for preventive measures was from several published studies, including a meta-analysis. The accuracy of screening was a key input for the model and was from published studies.

Monetary benefit and utility valuations:
The utility values were from published studies.

Measure of benefit:
Quality-adjusted life-years (QALYs) were used for the cost-utility analysis, and pre-eclampsia cases avoided were used for the cost-effectiveness analysis. A 3% annual discount rate was applied for the long-term cost-utility analysis.

Cost data:
The economic analysis included the costs of the screening tests, standard care (visits and preventive measures), hospitalisation before delivery, vaginal delivery, caesarean delivery, and neonatal intensive care unit stay. The costs were based on official list prices provided by the Israeli Ministry of Health. The costs of the screening tests were based on prices in Israel, as well as in other European countries. All costs were converted to US $, using purchasing power...
parity. A 3% annual discount rate was applied to the long-term costs.

**Analysis of uncertainty:**
One-way sensitivity analyses were carried out on selected inputs, including the cost of the screening test, the false-positive rate, pre-eclampsia prevalence, the detection rate of the test, and the effectiveness of preventive measures. Some alternative estimates or ranges were from published sources.

**Results**
In the short-term, the expected costs were $511 with no screening and $633 with screening. The expected pre-eclampsia cases were 0.017 with no screening and 0.015 with screening. The incremental cost per pre-eclampsia case averted with screening was $66,949. This figure fell to $8,631 when considering the period until discharge.

In the long-term, the expected costs were $4,888 with screening and $4,783 without screening. The QALYs were 30.426286 with screening and 30.420735 without screening. The incremental cost per QALY gained with screening over no screening was $18,919.

The cost of the screening tests and the prevalence of disease were two key drivers of the model. Lower costs and higher prevalence favoured the cost-effectiveness of screening. With variations in the screening detection rate and surveillance effectiveness, the cost per QALY gained ranged from $92,850 in the worst case to $5,322 in the best case.

**Authors' conclusions**
The authors concluded that routine screening for pre-eclampsia was cost-effective in various scenarios.

**CRD commentary**
**Interventions:**
The selection of the comparators was appropriate as the proposed screening strategy was compared with usual care, which was no screening. The types of tests included in the screening strategy were clearly reported.

**Effectiveness/benefits:**
The clinical inputs were from selected published studies that were not fully described. In general, Israeli databases were supplemented with international data. The prevalence of pre-eclampsia was from a large local database, which had a lower prevalence than in published studies. This was acknowledged as a conservative assumption against screening, and was tested in the sensitivity analysis. Few details were given on sources for test accuracy, making it difficult to judge the validity of these estimates, and the data for the treatment effect, but these were extensively tested in the sensitivity analysis. Both disease-specific outcome measures and QALYs were used, allowing comparisons with other diseases. The derivation of the utility values was not reported and they were not varied in the sensitivity analyses.

**Costs:**
The economic analysis was consistent with the perspective stated. The key unit costs and quantities of resources were reported, enhancing the transparency and replicability of the study. The data sources were provided and most of the economic inputs were valued using Israeli price lists. The price year was not clearly stated, hindering reflation exercises. It seems that the costs were appropriately converted to US $. They were treated deterministically and no statistical tests were carried out on the economic inputs, but key estimates were varied in the sensitivity analyses.

**Analysis and results:**
The results were extensively presented. An incremental approach was appropriately used to synthesise the costs and benefits of the alternative strategies. The uncertainty was investigated in a deterministic analysis that focused on selected inputs. A more comprehensive approach could have considered the overall uncertainty in multiple parameters. The structure of the model and key assumptions were clearly described. The results appear to be specific to pregnant women in Israel and might not be transferable to other settings, but the authors showed that using estimates from other countries improved the cost-effectiveness of screening.

**Concluding remarks:**
The analysis of uncertainty focused on selected inputs for the model, but the cost-effectiveness framework was robust and the authors' conclusions appear to be valid.
Funding
Funding received from the European Union, and the Canada-Israel industrial R&D Fund.

Bibliographic details

PubMedID
22234821

DOI
10.1002/pd.2871

Original Paper URL

Indexing Status
Subject indexing assigned by NLM

MeSH
Adult; Cost of Illness; Cost-Benefit Analysis; Decision Support Techniques; Diagnostic Tests, Routine /economics /methods; Female; Health Care Costs; Humans; Models, Theoretical; Pre-Eclampsia /diagnosis /economics /prevention & control; Pregnancy; Primary Prevention /economics /methods

AccessionNumber
22012010334

Date bibliographic record published
27/06/2012

Date abstract record published
26/11/2012