Cost-effectiveness of elective induction of labor at 41 weeks in nulliparous women

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 elective induction of labour at 41 weeks of gestation, compared with expectant management and antenatal testing until 42 weeks, for nulliparous women with a low-risk singleton pregnancy. The authors concluded that induction reduced the maternal and neonatal adverse outcomes and was cost-effective. The cost-effectiveness framework was conventional and the authors’ conclusions appear to be robust. A better description of the data sources would have aided a judgement of the validity of the analysis.

Type of economic evaluation
Cost-utility analysis

Study objective
This study examined the cost-effectiveness of the elective induction of labour at 41 weeks, compared with expectant management and antenatal testing until 42 weeks, in singleton, nulliparous, low-risk women.

Interventions
The two strategies were the elective induction of labour at 41 weeks versus expectant management plus antenatal testing.

Location/setting
USA/hospital.

Methods
Analytical approach:
The analysis was based on a decision-analytic model, with a hypothetical cohort of women who had not previously given birth and were at low risk of complications, with a single, cephalic-presentation gestation, from 41 weeks of pregnancy. The authors stated that the perspective was societal.

Effectiveness data:
The clinical evidence was from a selection of published sources, including the National Birth Cohort database, which provided information on caesarean delivery rates in all term, singleton deliveries in the USA in 2003, and the University of California, San Francisco publications. The authors selected the most appropriate estimates from the available evidence. A key assumption was that the probability of caesarean delivery was the same for elective induction of labour at 41 weeks as for expectant management. This was based on the results of recent meta-analyses and systematic reviews. The key clinical inputs were the rates of maternal and neonatal complications.

Monetary benefit and utility valuations:
The utility values were from published sources or authors’ opinions.

Measure of benefit:
Quality-adjusted life-years (QALYs) were the summary benefit measure and a 3% annual discount rate was applied.

Cost data:
The economic analysis included the costs of antenatal testing, caesarean delivery, epidural, induction, vaginal delivery, newborn stay with or without complications, and neonatal death. All the economic data were from published studies. The costs were in US dollars ($) and were discounted at an annual rate of 3%. The price year was 2007 and costs were
inflated using the consumer price index.

Analysis of uncertainty:
Deterministic one- and multi-way sensitivity analyses were carried out to assess the impact of variations in the key parameters, especially the rate of caesarean delivery after labour induction, using alternative estimates from a recent systematic review. A probabilistic sensitivity analysis was carried out, using Monte Carlo simulation.

Results
In a hypothetical cohort of 200,000 women, the projected costs were $2,319,260,799 with induction and $2,247,401,242 with expectant management. The benefits were 11,382,025 with induction and 11,375,460 with expectant management. The incremental cost per QALY gained with induction over expectant management was $10,945.

Variations in the rate of caesarean delivery after labour induction, compared with that for expectant management, did not affect the results as the incremental ratio ranged from $2,932 (22% lower than management) to $27,612 (22% higher). Induction became dominant when the likelihood of spontaneous labour was below 25%. The results were robust to variations in the other inputs.

Labour induction was more effective and less expensive (dominant) in 24% of simulations and was cost-effective in 96% of simulations, at a willingness to pay threshold of $50,000.

Authors' conclusions
The authors concluded that labour induction at 41 weeks of gestation reduced the maternal and neonatal adverse outcomes and was cost-effective.

CRD commentary
Interventions:
The comparators were appropriately selected as they were the two viable strategies for these pregnant women at 41 weeks gestation.

Effectiveness/benefits:
No systematic review was reported to identify the relevant sources of data. A large database was used for some inputs, and some data were from systematic reviews or meta-analyses, but these were not described and no information on the other sources was given. This limits the possibility of objectively assessing the validity of the clinical inputs. Heterogeneity between sources was not considered and their patient populations or other characteristics might have differed. The authors stated that their extensive sensitivity analyses should overcome the potential bias in some published studies. QALYs were a valid benefit measure and were particularly appropriate for this patient population because of the impact of the interventions on quality of life and survival of both infants and mothers. Good sources for the utility weights for some health states were hard to find and many assumptions were needed.

Costs:
The perspective was stated to be societal. The data sources were not described and this reduces the transparency of the analysis. The unit costs were reported for some categories, while others were presented as category totals. This lack of detail made it unclear if the costs were appropriate for the perspective. The price year and discounting were explicitly reported. The impact of alternative estimates was considered in the sensitivity analyses.

Analysis and results:
The results were clearly presented. An appropriate incremental approach was used to synthesise the costs and QALYs of the two strategies. The time horizon was not clearly reported, but appears to have been the lifetimes of the women and their children. Appropriate sensitivity analyses were carried out to test how robust the base case findings were to variations in the clinical and economic inputs. The authors stated that their analysis focused on nulliparous, low-risk women and could not be extended to other pregnant women. The analysis was specific to the US context and might not be transferable to other settings.
Concluding remarks:
The cost-effectiveness framework was conventional and the authors’ conclusions appear to be robust. A better description of the data sources would have helped in judging the validity of the analysis.

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