Cost-effectiveness of elective cesarean delivery after one prior low transverse cesarean

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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.

Health technology
Elective caesarean delivery after one prior low transverse caesarean.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population consisted of pregnant women with one prior low transverse caesarean delivery.

Setting
The setting was secondary care. The economic study was conducted in Chicago, Illinois, USA.

Dates to which data relate
Effectiveness data were extracted from studies published between 1987 and 1998. Cost data were extracted from studies published between 1993 and 1998. 1999 prices were used.

Source of effectiveness data
Effectiveness data were derived from a synthesis of previously completed studies.

Modelling
A decision-tree model incorporating a Markov analysis was used to examine the reproductive life of a hypothetical cohort of 100,000 pregnant women whose only prior pregnancy was delivered through a low transverse caesarean section.

Outcomes assessed in the review
The main health outcomes assessed in the review were maternal and neonatal morbidity and mortality, namely:

maternal: endometritis, DVT (deep vein thrombosis), wound infection, operative injury, transfusion, hysterectomy, and maternal death; and

neonatal: cerebral palsy, death, ICU use.
Study designs and other criteria for inclusion in the review
Randomised controlled trials, and prospective multicentre studies were among those studies referenced by the authors.

Sources searched to identify primary studies
The authors searched the Obstetrics and Gynecology Journal, New England Journal of Medicine, JAMA publications, American Vital Health statistics, and Archives of Internal Medicine.

Criteria used to ensure the validity of primary studies
Studies dealing with the same topic analysed by the authors were considered, but the authors did not specify the criteria used in assessing their validity.

Methods used to judge relevance and validity, and for extracting data
3 authors were involved in data extraction. The most reasonable estimate for each variable was used to create a base-case probability value for the model.

Number of primary studies included
14 studies were used in the derivation of input parameters for the model with regard to effectiveness.

Methods of combining primary studies
The most reasonable estimate for each variable was used to create a base-case probability for the model, using mainly average values for each variable.

Investigation of differences between primary studies
Not stated.

Results of the review
The probabilities for maternal and neonatal complications were:

**MATERNAL**

- Endometritis: elective caesarean delivery, 6%; vaginal delivery after TOL (trial of labour), 3% (range: 2 - 5); caesarean delivery after TOL, 12% (range: 8 - 16); uterine rupture, 25% (range: 8 - 32).

- DVT: elective caesarean delivery, 0.3%; vaginal delivery after TOL (trial of labour), 0.1% (range: 0.06 - 0.2); caesarean delivery after TOL, 0.3% (range: 0.3 - 0.9); uterine rupture, 0.3% (range: 0.3 - 0.9).

- Wound infection: elective caesarean delivery, 2%; vaginal delivery after TOL (trial of labour), 0%; caesarean delivery after TOL, 3% (range: 2.5 - 4.5); uterine rupture, 8% (range: 2.5 - 15).

- Operative injury: elective caesarean delivery, 1%; vaginal delivery after TOL (trial of labour), 0%; caesarean delivery after TOL, 2% (range: 1.5 - 3.5); uterine rupture, 12% (range: 6 - 25),

- Transfusion: elective caesarean delivery, 1.7%; vaginal delivery after TOL (trial of labour), 1% (range: 0.85 - 1.7); caesarean delivery after TOL, 1.7% (range: 1.7 - 3.4); uterine rupture, 30% (range: 20 - 40),

- Hysterectomy: elective caesarean delivery, 0.3%; vaginal delivery after TOL (trial of labour), 0.1% (range: 0.05 - 0.3); caesarean delivery after TOL, 0.4% (range: 0.3 - 0.9); uterine rupture, 19% (range: 18 - 27).

- Maternal death: elective caesarean delivery, 0.025%; vaginal delivery after TOL (trial of labour), 0.01% (range: 0.006 -
0.02); caesarean delivery after TOL, 0.038% (range: 0.025 - 0.05), uterine rupture, 1% (range: 0.5 - 1.2).

NEONATAL

Cerebral palsy: elective caesarean delivery, 0%; vaginal delivery after TOL (trial of labour), 0% (range: 0 - 0.02); caesarean delivery after TOL 0% (range: 0 - 0.02), uterine rupture, 5% (range: 2.5 - 10).

Death: uterine rupture, 5% (range: 2.5 - 10).

ICU: uterine rupture, 15% (range: 10 - 25).

Measure of benefits used in the economic analysis

Major neonatal complications avoided were used in the economic analysis, namely avoidance of death and permanent neurologic sequelae.

Direct costs

Due to the chosen perspectives only direct costs were considered in the analysis, viz: costs of vaginal or caesarean procedures, maternal complications and neonatal complications. Quantities and costs were not presented separately. In circumstances when only charge data were available, these were converted to cost data using a cost-to-charge ratio of 0.6. Costs derived before 1999 were adjusted for inflation to reflect 1999 dollars according to the medical care component of the consumer price index. Future costs were discounted at 3%.

Statistical analysis of costs

Not relevant due to the modelling approach; variability was addressed in the sensitivity analysis reported below.

Indirect Costs

Indirect costs were not considered.

Currency

US dollars ($).

Sensitivity analysis

Univariate sensitivity analyses in which each variable was altered between the upper and lower limits of its plausible value were used; the variables to which the model was most sensitive were then further tested using multivariate sensitivity analysis.

Estimated benefits used in the economic analysis

Averted neonatal neurologic injury was as follows:

for a total of 117,748 caesarean deliveries: second child, 25; third child, 9; fourth child, 3, total 37; and

averted neonatal deaths: second child 25; third child, 9, fourth child, 3, total 37.

Cost results

The base costs were as follows: vaginal delivery after TOL, $3,578; elective caesarean delivery, $5,511; caesarean delivery after TOL, $6,889, total maternal complications, $12,280 and infant complications, $185,022.

Costs associated with a policy of elective caesarean delivery for 100,000 women during their reproductive life were...
estimated to be: second child, $109 million for 75,000 caesarean deliveries; third child, $53 million for 31,861 caesarean deliveries; and fourth child, $17 million for 10,887 caesarean deliveries, a total of $179 million.

**Synthesis of costs and benefits**

The prevention of one major adverse neonatal outcome (neurologic injury or death) requires 1,591 caesarean deliveries costing $2.4 million.

**Authors’ conclusions**

Routine elective caesarean for a second delivery for women with a prior low transverse caesarean incision results in an excess of maternal morbidity and mortality and a high cost to the medical system.

**CRD COMMENTARY - Selection of comparators**

The reason for the choice of the comparator, trial of labour after a previous caesarean delivery, is clear, as both procedures, natural labour and secondary caesarean, are used after a previous caesarean delivery. You, as a database user, should consider if the same applies to your own setting.

**Validity of estimate of measure of effectiveness**

The authors did not explicitly state that a systematic literature review was undertaken, so it is unclear if the review was conducted in a fashion intended to minimise biases. Effectiveness results were combined and average values were used for base-case entries into the model. The authors did not adopt a weighting scheme to reflect differences in sample sizes for the primary studies used.

**Validity of estimate of measure of benefit**

The estimation of benefits was modelled and the decision tree Markov based model was appropriate for this purpose.

**Validity of estimate of costs**

For the cost perspectives adopted, health system, third party-payer, all relevant categories of costs were considered; quantities and costs were not presented separately; costs were discounted at a rate of 3%.

**Other issues**

Relevant comparisons with studies dealing with the same topic were performed and the modelling approach tends to increase the generalisability of costs (due to the wide range of sensitivity analyses performed).

**Implications of the study**

The authors suggest that their modelling approach can assist health care providers and patients in making informed choices regarding delivery. They also indicate that research into the impact of the consequences of different delivery policies on patient's quality of life could provide further assistance in the decision-making process.

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None stated.

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