Cesarean delivery for women presenting with genital herpes lesions: efficacy, risks, and costs

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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
Caesarean delivery for pregnant women presenting for delivery with symptomatic genital herpes lesions.

Type of intervention
Primary prevention.

Economic study type
Cost-utility analysis and cost-effectiveness analysis.

Study population
Two hypothetical cohorts of women presenting for delivery with genital herpes lesions: (a) those with a history of genital herpes lesions prior to delivery and (b) those with a first symptomatic showing of lesions at delivery.

Setting
Hospital. The economic study was carried out in California, USA.

Dates to which data relate
Effectiveness data for the model were taken from papers published between 1981 and 1991. Resource data were taken from papers published between 1977 and 1991. No dates were given for prices.

Source of effectiveness data
Review of previously published studies and opinions.

Modelling
A decision analysis model was used to estimate final outcomes and costs.

Outcomes assessed in the review
The review assesses the main outcomes of neonatal deaths, severe disability, moderate disability. The adverse event of maternal mortality was also considered.

Study designs and other criteria for inclusion in the review
The authors reviewed a range of studies including multi-centre prospective studies. No other criteria were given.
Sources searched to identify primary studies
The Medline database was searched.

Criteria used to ensure the validity of primary studies
Not stated.

Methods used to judge relevance and validity, and for extracting data
No details were provided.

Number of primary studies included
19 studies are included (providing data on different elements of the model).

Methods of combining primary studies
The papers are given a ranking according to the following scale: (a) baseline data point established with a high level of confidence (from multi-centre prospective studies) (b) baseline data point established with a moderate level of confidence (large prospective studies at single centres) (c) baseline data point estimated with a low level of confidence (using data from select populations) The baseline probability values used are the “most plausible” estimates to the authors. Then ranges were given, so the data was not combined as such. The extremes of the ranges are used in the sensitivity analysis.

Investigation of differences between primary studies
No investigation of differences was performed.

Results of the review
The main effectiveness data, in terms of probability estimates was reported as follows: neonatal deaths: 0.183; neonatal severe disability: 0.154; neonatal moderate disability: 0.101; neonatal normal outcome: 0.562; maternal mortality of caesarian delivery in excess of vaginal delivery: 0.00015.

Methods used to derive estimates of effectiveness
Authors’ assumptions were used to estimate efficacy of caesarian delivery in preventing neonatal HSV infections.

Estimates of effectiveness and key assumptions
The baseline efficacy rate of 80% was assumed.

Measure of benefits used in the economic analysis
Cases of neonatal HSV averted and QALYs were calculated using a model. Death was scaled as zero, adjusting severe disability as 0.1 and moderate disability as 0.5. No other details were given.

Direct costs
Costs were discounted at 4%. Quantities and costs were not reported separately. The difference in the cost between vaginal and Caesarean deliveries (including complications), the cost of hospital care for neonatal herpes infection and the lifetime costs of caring for disabled children were included. Cost estimates were obtained from the literature. Price dates were not given. Costs were reflated using the Consumer Price Index for Medical Care. Final costs were calculated using a model.
Currency
US dollars ($).

Sensitivity analysis
A sensitivity analysis was carried out using the range of values found in the literature and was performed on the effectiveness of the data but not the cost data. The variability of data was measured using a one-way simple sensitivity analysis.

Estimated benefits used in the economic analysis
QALYs were discounted at 4%. Using the baseline data, Caesarean delivery for herpes lesions at delivery in women with a history of herpes lesions prevented 9 neonatal infections per 1 million births. In women with no history of genital HSV, Caesarean delivery prevented 18 neonatal infections per 1 million births. The infants’ QALYs gained were 126.7 and 267.6 for the two groups respectively. These were adjusted subtracting the years of maternal life lost (19.3 and 0.3 respectively).

Cost results
Duration of costs was 30 years. With respect to the standard delivery, the incremental total cost of caesarian deliveries was $21,808,300 per 1 million births from mothers with recurrent HSV. In contrast, caesarian deliveries produced a saving of $705,562 per 1 million births from HSV history negative mothers.

Synthesis of costs and benefits
The total cost of Caesarean delivery to prevent HSV transmission from women with recurrent herpes is more than $2.5 million per case of neonatal HSV averted, at a cost of $203,000 per QALY gained. For women with no history of genital HSV before delivery, the cost per case of neonatal HSV averted is a saving of over $38,000 and a saving of $2,600 per QALY gained. For women with no history of HSV lesions, only when the preventative efficacy of Caesarean delivery is lowered to 0.8% at minimal transmission rates does the number of maternal deaths exceed the number of neonatal deaths prevented. With 10% preventative efficacy the cost per QALY increases to more than $22,000. Increasing the excretion rate of HSV to 33% leads to a cost per QALY of over $113,000. At a transmission rate of 0.57% for women with recurrent herpes, the number of maternal deaths caused per neonatal death prevented falls to 0.23. The cost per case of neonatal HSV averted is $977,250 and the cost per QALY gained for women with recurrent herpes, the number of maternal deaths outweighs the number of neonatal deaths. Assuming the risk of transmission for women with recurrent herpes is 2.5% (higher than the baseline estimate), the number of excess Caesarean deliveries per neonate saved falls to 632 and the number of maternal deaths for every neonatal death prevented falls to 0.23. The cost per case of neonatal HSV averted is $977,250 and the cost per QALY gained for women with recurrent herpes is $70,800. Reducing the risk of transmission to 0.25% for recurrent herpes leads to a rise in the cost per case averted to over $10 million, more than 6300 excess Caesarean deliveries and 2.28 maternal deaths per neonatal death prevented. Varying the efficacy of Caesarean delivery in recurrent herpes, from 80% to 0%, increases the number of maternal deaths for each neonatal death prevented.

Authors’ conclusions
Maternal mortality and morbidity caused by Caesarean delivery in women with recurrent herpes lesions is very high and very costly. The number of maternal deaths caused by Caesarean delivery exceeds the number of neonatal deaths caused by HSV infection. In contrast, for women presenting with first episode genital lesions, at delivery, the number of neonatal QALYs gained exceeds the number of maternal QALYs lost, saving money and lives. However, more data is needed on transmission rates and the efficacy of Caesarean delivery.

CRD Commentary
More information is needed on the search strategy of the reviewing and the authors might have looked at other databases. No information is given on how the "best guesses" from the range of estimates given in the literature, was...
derived. The authors only say that they took, as their base value, the most plausible estimate from the literature. As regards the cost data, no price dates are given and we do not have information on the quantities assumed in the estimates. As with the reviewing, we cannot be sure how thoroughly the cost data was searched for. The sensitivity analysis on effectiveness was quite thorough, but one was not performed on the cost estimates. QALYs are used for representing neonatal and maternal benefits although is a neonatal QALY equal to a maternal QALY, one wonders? But this is on the whole a useful study which raises the urgency of further research into the cost-effectiveness of HSV management in pregnant women.

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**Other publications of related interest**

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