Exploring cost and quality: community-based versus traditional hospital delivery systems

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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
The comparison of midwifery practice in a free-standing birth centre (BC) with traditional obstetric practice in a hospital setting, during intrapartum care. Certified nurse midwives provided care in both settings.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised pregnant women deemed to be at low risk during childbirth, i.e. low labour and delivery care risk.

Setting
The setting was community versus secondary care. The economic study was performed in New York State, USA.

Dates to which data relate
The effectiveness evidence was taken from studies published between 1986 and 1992. The model generated resource use from the effectiveness parameters. The price year was not stated.

Source of effectiveness data
The effectiveness data were based on a review of previous studies.

Modelling
A decision analysis model was developed to address the costs and outcomes of labour and delivery in the two treatment settings.

Outcomes assessed in the review
The outcomes assessed in the review were maternal and infant mortality, and complications during delivery. Minor complications could be dealt with in the setting in which they occurred. Serious complications had to be dealt with in a traditional hospital setting.

Study designs and other criteria for inclusion in the review
The main studies reviewed were an uncontrolled descriptive study, and a retrospective cohort study based upon the
uncontrolled descriptive study.

The included studies examined low-risk childbirth. The authors did not report any other inclusion or exclusion criteria, nor did they describe the design of other studies used to populate the model.

**Sources searched to identify primary studies**
Not reported.

**Criteria used to ensure the validity of primary studies**
Not reported.

**Methods used to judge relevance and validity, and for extracting data**
Not reported.

**Number of primary studies included**
Ten references provided the effectiveness evidence used in the model.

**Methods of combining primary studies**
Where combined, the authors described how they combined the data from the individual studies.

**Investigation of differences between primary studies**
The authors described the possible reasons for differences between studies, although they did not investigate how these differences affected the estimate of the effectiveness of the technology. The differences between studies arose mainly from differences in the definition of low-risk childbirth.

**Results of the review**
The probability of experiencing serious complications was 0.1. Women experiencing serious complications in a BC were transferred to hospital.

Infant mortality was found to be 1.3 per 1,000 births. However, the authors assumed that it was the same in both settings and did not include infant mortality within the model. It was used to calculate the probability of mortality from serious complications.

The authors did not report the maternal mortality rate used, although they stated that it was very low.

The authors did not report the overall probability of experiencing a minor complication.

**Measure of benefits used in the economic analysis**
Using the Delphi technique, "utility" values were derived for each clinical outcome, given the appropriateness of the place of birth. The values ranged from zero for infant or maternal mortality, to one for a vaginal delivery in BC with no, or minor, complications. This utility measure captured patient satisfaction with care rather than quality of life. The authors did not state how these values were derived, or from which group of people they were calculated, for example mothers or health care professionals.

**Direct costs**
The direct unit costs were:
treatment of minor complications, $50 in the BC and $100 in hospital;
certified nurse midwife fee for prenatal care, $700 in both settings;
certified nurse midwife fee for vaginal delivery and postpartum care, $224 in both settings;
physician fee for Caesarean delivery and postpartum care, $1,365 in both settings;
hotel cost for Caesarean delivery in hospital, $4,916;
hotel costs for vaginal delivery, $1,962 at the BC and $2,791 in hospital;
transfer from the BC to the hospital by advanced life support ambulance, due to a serious complication, $250; and
ambulance transfer from the BC to the hospital, for other reasons, $100.

The estimation of quantities and costs was derived through the model. The quantities of resources were derived from
the effectiveness parameters and were not reported by the authors. The costs were taken from the local healthcare
corporation, which owned both facilities. The costs used related to patient and ambulance charges rather than actual
costs, and these charges were based upon diagnostic-related groups (DRGs). Discounting was not performed as all costs
were incurred during the first year. The authors did not state the price year.

Indirect Costs
Indirect costs were not used in the model.

Currency
US dollars ($).

Sensitivity analysis
One way sensitivity analysis was performed on the probability of transfer from the BC to hospital, and the hotel cost of
the BC. The authors also varied the "opening cost" of the BC, although it is unclear how they defined "opening cost".

Estimated benefits used in the economic analysis
The estimated benefit for the average low-risk birth, in terms of effectiveness or appropriateness of setting, was greater
for the BC than the hospital, 0.925 and 0.795, respectively. The incremental benefit (not reported) was 0.13. This
benefit accounted for complications during childbirth, including maternal and infant mortality. The duration of the
benefit related to the mother's time in care during childbirth, i.e. the episode of care relating to the DRGs.

Cost results
On average, the total cost per low-risk childbirth was $3,385 for the BC and $4,673 for the hospital. The period of time
to which these costs related was the episode of care. This cost was related to the DRG, and the average number of days
this related to was not reported. The costs were not discounted since the duration of care was less than one year.

Synthesis of costs and benefits
The BC provided more benefit at less cost than the hospital, indicating that the BC dominates in terms of cost-
effectiveness. Consequently, it was unnecessary to synthesise the costs and benefits.

Of the parameters varied in the sensitivity analysis, two sensitive parameters were reported. The BC stopped being cost-
effective when the probability of transfer rose to 62% or more, and when the hotel cost of the BC was greater than that
for the hospital.
Authors’ conclusions
The freestanding BC is a cost-effective model of health care delivery for low-risk labour and delivery care. It is more effective and costs less than traditional hospital-based care. The outcome of appropriateness of setting, as considered by the authors, is dependent upon the probability of transfer from the BC to hospital.

CRD COMMENTARY - Selection of comparators
Given that the comparator was the traditional method of delivery in a hospital setting, the author selected a suitable comparator.

Validity of estimate of measure of effectiveness
A literature review was conducted to find effectiveness data with which to populate the model. Unfortunately, the authors did not state what sources were searched, or whether or not they adopted a systematic approach. Consequently, the reader should be aware that other data sources may exist which either support or contradict the authors’ conclusions on effectiveness.

Where necessary, effectiveness measures were combined using narrative methods to populate the model. It was unclear whether the authors took into account the disparate nature of the sample sizes in the two settings, although since the sample size was over 2,000 for both settings this should add credibility to the results. The literature evidence was not derived from randomised trials, but was based on an uncontrolled study and a retrospective cohort study; these are not as reliable as randomised trials.

The parameters in the model defined the effectiveness measures, and the main measures were maternal and infant mortality. The authors did not report the number of mortalities, nor include infant mortalities within the model: infant mortality was very low and they found no evidence to support the claim that infant mortality was higher in freestanding BCs. You, as a user of the database, should consider whether this assumption is appropriate in your own setting.

Validity of estimate of measure of benefit
The measure of benefit was not valid. It is unclear how this measure was calculated, what group of people it was calculated from, or what the actual utility score meant. Decision-makers should be wary of making decisions based upon the benefit measure used in the article.

Validity of estimate of costs
The costs used were suitable for the perspective adopted. Costs were based on charges and the authors acknowledged that this is not necessarily an accurate reflection of true costs. This was particularly relevant as the charges related to DRGs, which are based on the average cost of treating a patient with a particular diagnosis. The charge did not reflect those situations where patients had either a shorter or longer length of stay than the DRG average. To account for the true cost of transfers, although this was not reflected in the charge made by the hospital, the authors incorporated the true hotel and facility costs into their cost estimates. The price year was not stated. The paper would have provided more value to decision-makers had the authors reported their assumptions regarding quantity of resources, in particular the duration of stay and the frequency of complications.

The sensitivity analysis attempted to address the uncertainty around the BC hotel cost by increasing it to that of the hospital hotel cost. The study findings may be limited because the authors did not perform sensitivity analysis on quantities. Decision-makers should also include the costs of opening a BC when examining the potential of such facilities in their own settings.

Other issues
The authors concluded that their results provided evidence that BCs should be used for low-risk births. However, the reporting of the results does not enable the reader to generalise the findings to their own setting.
The authors reported some of the limitations of their study, in particular the use of charges as a proxy for costs, and the limited evidence available on BC effectiveness.

Maternity services in the UK are frequently in the news. Recently, there has been increased focus on choice for mothers, with more emphasis on the role of natural childbirth instead of obstetric hospital-based care. Decision-makers will be aware of such issues, and this study attempts to provide evidence of the cost-effectiveness of childbirth in a community facility. However, in the UK, more emphasis has been placed on home birth rather than freestanding BCs which, if not already in place, would require capital investment not explored in this article. Despite this, decision-makers may be considering the ethos of the BC, i.e. midwife-led care, in a hospital setting. This type of centre of ward would carry a proportion of the hospital's overheads, but should be cheaper than traditional obstetric wards as it would not need to have the obstetrician and high technological backup support. In addition, support would be available nearby if serious complications arose, thereby saving expenditure on transport. Further evidence on effectiveness, particularly maternal and infant mortality, is required before decision-makers opt for either midwife-led care or BCs.

**Implications of the study**
The authors concluded that the community-based, freestanding BC is a cost-effective alternative to traditional hospital-based care for low-risk childbirth. More research is needed to investigate BC outcomes and to identify the real costs of care.

This type of care is particularly relevant because health care is shifting from the traditional setting to community-based settings.

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None stated.

**Bibliographic details**

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**Other publications of related interest**

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Subject indexing assigned by NLM

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