Predicting preterm birth: a cost-effectiveness analysis
Mozurkewich E L, Naglie G, Krahn M D, Hayashi R H

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
Management strategies for threatened preterm labour in gravid patient (defined as having regular uterine contractions).

Type of intervention
Primary prevention and treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Gravid patients diagnosed with threatened preterm labour between 24 and 34 weeks, with intact membranes, and without advanced cervical dilation.

Setting
Hospital in the USA.

Dates to which data relate
Effectiveness and resource use data were collected from studies published between 1992 and 1999. Cost data were derived from institutional statistics and three studies published between 1994 and 1998. The price year was 1999.

Source of effectiveness data
Effectiveness data were derived from a literature review.

Modelling
A decision analytic model was used to determine the cost-effectiveness of alternative strategies of threatened preterm labour. The time horizon of the model was until the time of hospital discharge or death of the newborn.

Outcomes assessed in the review
The review assessed the probability of preterm birth, the effectiveness of tocolytics for delay of delivery, the test characteristics of fetal fibronectin, cervical length, and the effectiveness of corticosteroid treatment.

Study designs and other criteria for inclusion in the review
Effectiveness estimates were derived from published meta-analyses and large randomised trials.
Sources searched to identify primary studies
Data on cervical length were derived from a systematic search of MEDLINE up to June 1999.

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

Methods used to judge relevance and validity, and for extracting data
Summary statistics from individual studies.

Number of primary studies included
At least 10 studies were included in the review.

Methods of combining primary studies
Narrative method.

Investigation of differences between primary studies
Not stated.

Results of the review
The sensitivity and specificity of fetal fibronectin was 0.54 and 0.87, respectively. The probability of preterm birth was 0.50. The proportion of those women destined to deliver prematurely who were delivered within 48 hours was 0.5. The effectiveness of tocolytics for delay of birth less than 48 hours was 0.44. The fractional decrease in effectiveness of tocolytics with short-term treatment was 0.5. The probability of respiratory distress syndrome (RDS) was 0.23. The effectiveness of optimal corticosteroids was 0.65. The fractional decrease in effectiveness with suboptimal treatment was 0.36. The probability of neonatal death was 0.11. The effectiveness of corticosteroids in preventing death was 0.34. The fractional decrease in effectiveness of corticosteroids in preventing death with suboptimal treatment was 0.65. These data formed the principal input parameters of the model.

Measure of benefits used in the economic analysis
The number of cases of RDS and neonatal death was used as the measures of benefit.

Direct costs
Direct costs were not discounted given the short time frame of the study (less than 1 year). Quantities and costs were reported separately. Direct costs included triage or outpatient costs, costs of fetal fibronectin or cervical length testing, cost of hospitalisation and treatment, maternal costs of delivery, costs of neonatal care till death or discharge. The quantity/cost boundary adopted was that of the health service. The estimation of quantities and costs was based on actual data. Cost estimates were collected from the University of Michigan Hospital and from three studies. The price year was 1999. Costs were inflated by use of the Consumer Price Index for Medical Care Services.

Indirect Costs
Direct costs were not included.

Currency
US dollars ($).
Sensitivity analysis
One-way sensitivity analyses were conducted on all variables across their plausible ranges.

Estimated benefits used in the economic analysis
The number of RDS cases per 1,000 patients ranged from 50 (treat all strategy) to 102 (treat none strategy). The number of neonatal death cases per 1,000 patients ranged between 38 (treat all and the cervical length plus corticosteroids strategy) and 55 (treat none strategy).

Cost results
Costs per patient ranged from $12,000 (treat all with corticosteroids as outpatients, no tocolysis strategy) to $14,900 (treat all strategy).

Synthesis of costs and benefits
The cost per additional RDS case prevented was:
- $167,000, rapid fetal fibronectin plus corticosteroids strategy,
- $233,000, cervical length plus corticosteroids strategy,
- $600,000, treat all strategy.

The cost per additional neonatal death case prevented was:
- $850,000, cervical length plus corticosteroids strategy,
- $6,000,000, treat all strategy.

These results were not sensitive to changes in the model’s parameters.

Authors’ conclusions
Risk prediction strategies with the fetal fibronectin assay or corticosteroids plus rapid fetal fibronectin testing or cervical length assessment may offer cost savings compared with treatment of all women with threatened preterm labour and may prevent similar numbers of cases of respiratory distress syndrome and neonatal deaths.

CRD COMMENTARY - Selection of comparators
A justification was given for the comparators used, namely that they represented currently available management strategies. You, as a user of the database, should decide if these health technologies are relevant to your setting.

Validity of estimate of measure of benefit
Although a thorough approach to derive the model’s data was used, the authors did not state that a systematic review of the literature had been undertaken. More details could have been provided about the design and conduct of the review and the method of combining primary effectiveness estimates. Estimation of benefits was obtained directly from the effectiveness analysis. Sensitivity analyses were undertaken to test for variability in the data used by the model.

Validity of estimate of costs
Some good features of the analysis included the following: all relevant cost categories were included; quantities and costs were reported separately; sensitivity analyses were conducted on costs and on quantities; costs were used to proxy prices; and the price year was reported. However, the authors did not consider indirect maternal costs, such as lost wages, costs resulting from long-term sequelae of RDS and associated complications of prematurity.
Other issues
The authors did make appropriate comparisons of their findings with those from other studies and the issue of
generalisability to other settings was not addressed. The authors do not appear to have presented their results selectively.
The study examined patients diagnosed with threatened preterm labour and this was reflected in the authors’
conclusions.

Implications of the study
Risk assessment with fetal fibronectin testing or cervical length assessment may find clinical utility among women with
threatened preterm labour because of their ability to identify women at low risk for preterm birth. The addition of
corticosteroids to these risk assessment strategies may produce still more favourable clinical outcome profiles at lower
costs.

Source of funding
None stated.

Bibliographic details

PubMedID
10871482

DOI
10.1067/mob.2000.106855

Indexing Status
Subject indexing assigned by NLM

MeSH
Adrenal Cortex Hormones /therapeutic use; Cervix Uteri /ultrasonography; Cost-Benefit Analysis; Decision Making,
Computer-Assisted; Decision Trees; Female; Fetal Blood; Fibronectins /blood; Forecasting; Humans; Infant, Newborn;
Infant, Premature; Obstetric Labor, Premature; Obstetrics /economics /methods; Pregnancy; Risk Factors; Sensitivity
and Specificity; Tocolytic Agents /therapeutic use

AccessionNumber
22000001151

Date bibliographic record published
31/03/2001

Date abstract record published
31/03/2001