Incremental cost-effectiveness of incorporating oestriol evaluation in Down syndrome screening programmes
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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
Prenatal screening tests for Down Syndrome (DS). In particular the use of the 'Double test'- a combination of two maternal blood tests, human chorionic gonadotropin (hCG) and alpha-fetoprotein (AFP), with maternal age-related risk, and the 'Triple test'- a combination of three maternal blood tests, unconjugated oestriol (uE3) with hCG and AFP, with maternal age-related risk.

Type of intervention
Screening.

Economic study type
Cost-effectiveness analysis.

Study population

Setting
Hospital/maternity care centre. The economic study was carried out in California, USA.

Dates to which data relate
Effectiveness of screening information was not dated. Resource data referred to the period 1991-92. Price date not given.

Source of effectiveness data
Synthesis of previous completed studies.

Modelling
A decision tree model was used to estimate costs.

Outcomes assessed in the review
Down Syndrome cases detected.

Study designs and other criteria for inclusion in the review
Internal memo from the Department of Health and other unspecified published studies.
Sources searched to identify primary studies
Not stated.

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

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

Number of primary studies included
Not stated.

Methods of combining primary studies
Not stated.

Investigation of differences between primary studies
Not stated.

Results of the review
A 5% increase in the detection rate of the 'Triple test' resulting from adding uE3 was based on the average value found in the literature. Under the base case assumptions of the Department of Health report, screening based solely on maternal age would detect 347 cases. The 'Double Test' would detect an additional 148 cases in comparison to maternal age screening and the 'Triple test' would detect an additional 44 cases in comparison to the 'Double Test'.

Measure of benefits used in the economic analysis
Down Syndrome cases detected.

Direct costs
Costs and quantity of the resources were reported separately. The study estimated only the direct health service costs of testing, ultrasound, amniocentesis, termination, administration and counselling. The costs were estimated using a decision tree. No price date was given.

Currency
US dollars ($)

Sensitivity analysis
Three sets of sensitivity analyses were performed examining both variability in data and the generalisability of the results. A two-way sensitivity analysis was undertaken varying both the incremental sensitivity of uE3 and the incremental cost of uE3. Additional sensitivity analyses examined variations in the base case level of effectiveness of the 'Triple test' (holding the incremental cost effectiveness constant) and variations in the rates of amniocentesis and abortion and a threshold analysis for amniocentesis costs.

Estimated benefits used in the economic analysis
A 5% increase in the detection rate of the 'Triple test' resulting from adding uE3 was based on the average value found
in the literature. Under the base case assumptions of the Department of Health report, screening based solely on maternal age would detect 347 cases. The 'Double Test' would detect an additional 148 cases in comparison to maternal age screening and the 'Triple test' would detect an additional 44 cases in comparison to the 'Double Test'.

Cost results
For a base-line population of 661,165 the total programme cost for screening based solely on maternal age was $65million, for the 'Double test' at an amniocentesis rate of 5.5% this cost rose to $72.9million and for the 'Triple test' the programme cost was estimated to be $78.2million.

Synthesis of costs and benefits
Results were expressed as an average cost-effectiveness ratio, as an incremental cost effectiveness ratio to screening based solely on maternal age and as an incremental cost effectiveness to the 'Double test'.

Under the base case assumptions the authors found that the addition of uE3 to the California screening programme would detect an additional 44 cases of Down Syndrome at an incremental cost effectiveness ratio of $119,100 compared with the 'Double Test' (average cost effectiveness ratio of $147,400) and would detect an additional 192 cases at an incremental cost effectiveness ratio of $68,200 in comparison with screening based solely on maternal age (average cost effectiveness ratio of $187,300).

The sensitive parameters were found to be the incremental cost and sensitivity of oestriol (e.g. when the incremental cost of oestriol is $16 and the incremental sensitivity of uE3 is 1% the incremental cost-effectiveness drops to $1,187,700 per case detected). Varying the amniocentesis rate had a marked effect on the incremental cost effectiveness ratio of uE3 (eg the incremental cost effectiveness ratio is $231,300 at a 50 per cent amniocentesis rate).

Authors' conclusions
Under base case assumptions the addition of uE3 to a Down syndrome screening programme of maternal age-adjusted AFP and hCG appears to be cost-effective. However, as the incremental cost of uE3 increases or its incremental effectiveness decreases, the incremental cost-effectiveness of adding uE3 quickly becomes unfavourable. The authors also recognise that since the Double Test and Triple test are associated with a significant decrease in the total number of amniocenteses it is reasonable to assume that this will result in fewer miscarriages of normal fetuses.

CRD Commentary
The study is based primarily on assumptions obtained from an internal memo from the Department of Health and without documented sources indicating how this data was derived it is difficult to determine the validity of the findings. The increase in the detection rate of the 'Triple test' resulting from the addition of uE3 to the screening programme was based on the average value found in the literature although the precise studies that were examined were not stated. No evidence was presented to show that a thorough search of existing literature on the effectiveness of uE3 had been undertaken and any differences in the literature that were found concerning the increase in the detection rate of uE3 were not explained, although this rate is critical given the authors' conclusions concerning the effect that variations in the incremental effectiveness of uE3 has on determining the incremental cost-effectiveness of adding uE3 to the current screening programme. The authors did note, however, that caution should be exercised interpreting their results given the nature of the assumptions and the use of retrospective data. However, the sensitivity analysis performed was good and highlighted many of the concerns raised above.

It should also be noted that the analysis presented reflects the cost-effectiveness estimates for the detection of Down syndrome pregnancies only. Both the 'Double test' and 'Triple test' are capable of detecting other abnormalities that affect placental function and as such the cost-effectiveness calculations, as the authors note, reflect minimal cost-effectiveness figures in terms of dollars per birth defect.

Bibliographic details

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Other publications of related interest

Indexing Status
Subject indexing assigned by NLM

MeSH
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