An economic analysis of anemia prevention during infancy
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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.

CRD summary
This study evaluated the cost-effectiveness of testing the reticulocyte haemoglobin content of blood for the detection of iron deficiency in infants between nine and 12 months old. The authors concluded that reticulocyte haemoglobin content testing was not an expensive option for preventing anaemia in infants with suspected iron deficiency. The methods were generally good, but the lack of reporting around the model inputs should be considered when interpreting this conclusion.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
This study evaluated the cost-effectiveness of the assessment of reticulocyte haemoglobin content of blood for the detection of iron deficiency in infants between nine and 12 months old.

Interventions
Reticulocyte haemoglobin content measurement plus treatment was compared with screening for anaemia by measurement of haemoglobin alone or in a complete blood count. For patients with a reticulocyte haemoglobin content of less than 27.5 picograms or established anaemia, a three-month course of iron therapy was prescribed.

Location/setting
USA/primary care.

Methods
Analytical approach:
A decision tree was used to synthesise the cost and effectiveness data from published studies and authors' assumptions. The two time horizons were three months and 10 years and the authors stated that the perspective was that of society.

Effectiveness data:
The estimates for screening sensitivity and specificity were derived from a single study (Ullrich, et al. 2005, see ‘Other Publications of Related Interest’ below for bibliographic details). The risk of neurocognitive disability in the long term was estimated based on the results of a study (Lozoff, et al. 2000, see ‘Other Publications of Related Interest’ below for bibliographic details). These clinical end points were used to calculate the rate of anaemia prevention, which was defined as the absolute risk reduction.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
The measure of benefit was the rate of anaemia prevention, as described above.

Cost data:
The costs included those of the screening tests (for reticulocyte haemoglobin, haemoglobin, and the full blood count) and treatment for anaemia and iron deficiency. For the ten-year time horizon, the long-term costs of treatment for neurocognitive disability were also included. The treatment costs were presented as total categories. The costs of the tests were from a laboratory fee schedule and the cost of iron therapy was based on local data. All costs were discounted...
at an annual rate of 3% and were reported in US dollars ($).

Analysis of uncertainty:
One-way and three-way sensitivity analyses were undertaken to assess the stability of the results over ranges of data for input parameters, such as disease prevalence, treatment duration, rate of follow-up testing, rate of disability, and costs.

Results
Over the three-month period, reticulocyte haemoglobin content testing was most accurate with a true-negative rate of 98% versus 93% for haemoglobin screening. Reticulocyte haemoglobin content testing resulted in treatment of 33% of the cohort, while haemoglobin testing resulted in 7% being treated. The absolute risk reduction between the strategies was 5%.

At three months, the cost per patient was $31 (95% CI 29.16 to 32.84) with reticulocyte haemoglobin content, $9 (95% CI 8.05 to 9.95) with haemoglobin testing, and $19 (95% CI 18.05 to 19.95) with complete blood count. The cost per case of anaemia prevented was $440 for reticulocyte haemoglobin content. The cost of treating established anaemia was $25 per patient with haemoglobin screening and $55 with a complete blood count.

Over 10 years, the cost per patient screened was $55 (95% CI 46.80 to 63.20) with reticulocyte haemoglobin content, $41 (95% CI 31.85 to 50.15) with haemoglobin, and $51 (95% CI 41.66 to 60.34) with a complete blood count. The cost per case of anaemia prevented was $280 for reticulocyte haemoglobin content.

The sensitivity analysis showed that the results were generally robust. In the long-term scenario, reticulocyte haemoglobin content was a less expensive screening option than haemoglobin testing when the treatment costs for neurocognitive disability were greater than $1,180.

Authors' conclusions
The authors concluded that reticulocyte haemoglobin content testing was not an expensive option for preventing anaemia in infants with possible iron deficiency.

CRD commentary
Interventions:
The screening tests were clearly reported and the comparators were tests commonly used in the authors' setting.

Effectiveness/benefits:
The model inputs were clearly described and presented. The effectiveness data were derived from a single study, but the full details of this study were not reported, which makes it difficult to ascertain whether or not the study was of high quality. The reliability of the results of the model depends on the validity of these data.

Costs:
The costs were presented as total categories and the unit costs and the resources used were not reported. These costs did not appear to include productivity losses for carers, which should be included for a societal perspective. The sources of cost data were reported clearly. The price year was not explicitly reported, but appears to have been 2007, which was the year that the paper was submitted.

Analysis and results:
The analysis of costs and effects was reported well and was easy to understand. The costs and effects were not combined and no summary measure of benefit, nor cost-effectiveness ratio, was presented. The results of the sensitivity analyses were well reported. The lack of information on the validity of the clinical inputs and on the cost items, makes it difficult to fully assess the reliability of the results.

Concluding remarks:
: The methods were generally good and clearly presented. An assessment on the validity of the clinical inputs was not possible and the costs might not have reflected the perspective. These limitations raise concerns and should be considered when interpreting the conclusions reached.
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