Cost-effectiveness of using an extensively hydrolysed formula compared to an amino acid formula as first-line treatment for cow milk allergy in the UK

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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
The objective was to estimate the cost-effectiveness of extensively hydrolysed formula compared with amino acid formula infant milk. The authors concluded that starting with an extensively hydrolysed formula for infants with a cow's milk allergy was most cost-effective. The clinical study design introduced some uncertainty in the results and the authors' conclusions apply to UK clinical prescribing practice.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The objective was to estimate the cost-effectiveness of an extensively hydrolysed formula (Nutramigen) milk, compared with an amino acid formula (Neocate) milk, for infants with an allergy to cow's milk.

Interventions
Extensively hydrolysed formula was compared with amino acid formula, as a nutritional preparation and first treatment for infants with cow's milk allergy.

Location/setting
UK/primary care.

Methods
Analytical approach:
A decision tree was constructed to reflect the management of infants under one year old, who were newly diagnosed with cow's milk allergy after visiting a general practitioner (GP). The model considered the decision by a GP to give an infant with suspected cow's milk allergy initially either an amino acid formula or an extensively hydrolysed formula milk. The actual percentage of patients who went on to receive other second-line therapies was modelled. The time horizon was 12 months and the perspective was stated by the authors to be that of the NHS in the UK.

Effectiveness data:
The model was populated with clinical outcomes and resource use data from the records of The Health Improvement Network (THIN), a nationally representative database of patients registered with GPs in the UK. THIN contained the records of approximately 1,200 infants with cow's milk allergy, under one year old, who in the previous five years had started their first clinical nutrition preparation of either an extensively hydrolysed formula or an amino acid formula. About 80% of infants started on an extensively hydrolysed formula and 20% on an amino acid formula. The analysis included 150 infants who received amino acid formula and 150 matched infants who received extensively hydrolysed formula.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
The measure of clinical effectiveness was the number of symptom-free weeks in the 12 months following the initial GP visit. The number of symptom-free months was used for the cost-effectiveness ratio.
Cost data:
The resource use over the 12 months from the first GP visit about the allergy was from THIN. The unit costs were from NHS Reference Costs, the Unit Costs of Health and Social Care, and the Drug Tariff. All costs were in UK £ for 2008 to 2009.

Analysis of uncertainty:
To assess uncertainty, the authors performed a deterministic and a probabilistic sensitivity analysis, using Monte Carlo simulation. The parameters and distributions were described and the results were plotted on a cost-effectiveness plane.

Results
The mean number of symptom-free months was estimated to be 8.6 for each group. Infants treated with an extensively hydrolysed formula had a mean 13.1 GP visits over the 12 months compared with 17.5 visits for those on amino acid formula (p<0.001).

The NHS cost of managing an infant with a cow's milk allergy over the first 12 months after consultation with a GP was estimated to be £1,853 with extensively hydrolysed formula and £3,161 with amino acid formula.

The sensitivity analyses found the cost-effectiveness of extensively hydrolysed formula relative to amino acid formula was very sensitive to the time to symptom resolution and the acquisition cost of the two types of milk.

Authors' conclusions
The authors concluded that starting with an extensively hydrolysed formula for infants with a cow's milk allergy was most cost-effective, as there were no significant differences in clinical outcome between the two groups.

CRD commentary
Interventions:
The authors set out to compare amino acid formula and extensively hydrolysed formula as first treatments. Second-line treatments were given to patients in the proportions seen in UK clinical practice, as in the THIN. Treatment sequences could have been evaluated, such as initial extensively hydrolysed formula followed by a second extensively hydrolysed formula, compared with initial extensively hydrolysed formula followed by soy milk or by an amino acid formula, but this analysis did not seek to identify the best sequence.

Effectiveness/benefits:
The effectiveness data were from an observational study. According to the authors, the advantage of this database was that the treatment patterns and resource use were from actual clinical practice rather than driven by a trial protocol. The authors stated that guidelines recommended extensively hydrolysed formula as the first-line treatment. There was no discussion of clinical trial results, comparing the two treatments, and these would have been helpful to put the clinical data into context.

Costs:
It appears that all the relevant categories of costs were included and were presented sufficiently. The authors reported the range of costs per can for each formula and the value used in the main analysis. They did not explain why these main values were chosen. The cost of extensively hydrolysed formula was close to the lower end of its range and the cost of amino acid formula was close to the upper end of its range.

Analysis and results:
The model structure was described in full detail, with a diagram. The results were well reported and the uncertainty was assessed in statistical tests of the differences for both costs and effects. There was reported to be no significant difference between the percentage of patients with unresolved symptoms after initial treatment (26% on extensively hydrolysed formula and 19% on amino acid formula), but the probability value was not given. A probabilistic sensitivity analysis was conducted, but the mean incremental cost-effectiveness ratio from this analysis and the percentage of simulations in which each formula was cost-effective were not reported. This would have been useful. The authors discussed the limitations of the clinical study design.

Concluding remarks:
The clinical study design introduced some uncertainty in the results and the authors' conclusions apply to UK clinical prescribing practice.

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