Breastfeeding and formula feeding: a preliminary economic analysis

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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
Breastfeeding and formula feeding of infants.

Type of intervention
Primary prevention.

Economic study type
Cost-effectiveness analysis and cost-utility analysis.

Study population
Newly born infants.

Setting
Community. This study was set in Australia.

Dates to which data relate
Effectiveness data were retrieved from studies previously published between 1987 and 1996. The price year was not stated.

Source of effectiveness data
Review of previously completed studies.

Modelling
Two cost models were used to calculate the cost per quality-adjusted life year (QALY) for breastfeeding premature babies to prevent NEC.

Outcomes assessed in the review
The following outcomes were assessed in the review: the number of NEC cases, the number of cases with gastrointestinal illness, the number of cases with eczema, the number of children with IQs below 85 and 71 at 8 years of age, the development of IDDM, the duration of illness related to otitis, the proportion of infants with prolonged episodes of otitis media, the prevalence of eczema, food allergy and respiratory allergy for ages 1-3 years, the rate of effusion free visits, the clinical outcome in terms of neurodevelopment in children with PKU, and the number of one-day maternal absences.

Study designs and other criteria for inclusion in the review
High quality epidemiological studies which comprised one single-centre and one multi-centre randomised controlled trial and one case-control study were included in the review.

Sources searched to identify primary studies
Not reported.

Criteria used to ensure the validity of primary studies
For most primary studies, the study design was reported. In the case of one study, methodological weaknesses of the study were reported.

Methods used to judge relevance and validity, and for extracting data
Summary statistics from each study were provided.

Number of primary studies included
The results of approximately 11 primary studies were included.

Methods of combining primary studies
Not applicable.

Investigation of differences between primary studies
Not applicable.

Results of the review
By increasing the nation-wide prevalence of exclusive breastfeeding from 60% to 80%, the total number of NEC cases would fall from 576 to 384 in low birthweight babies (n=16,000) and from 103 to 72 in very low birthweight babies (n=3,300). The number of cases with gastrointestinal illness in term babies (n=240,000) would drop from 9,504 to 6,432. The number of cases of eczema in low birthweight babies (n=16,000) would fall from 856 to 692, and in term babies (n=240,000) would fall from 26,880 to 20,640. The number of children with IQs below 85 and 71 at 8 years of age would fall from 3,360 to 2,880. Breastfeeding is found to have a protective effect on the development of IDDM (OR: 0.66, CI: 0.45 - 0.97). A reduced duration of illness related to otitis media was detected for breastfed infants compared with formula fed infants (5.9 +/- 3.5 days versus 8.8 +/-5.3 days, p=0.01). The proportion of infants with prolonged episodes of otitis media was 80% lower in breastfed infants. The prevalence of eczema, food allergy and respiratory allergy for ages 1-3 years were highest for infants who were never breastfed or breastfed exclusively for less than 1 month. A higher rate of effusion free visits was found in infants who had been partially or exclusively breastfed (p<0.0001). An improved clinical outcome in terms of neurodevelopment in children with PKU who were exclusively breastfed for 20-40 days was detected.25% of all one-day maternal absences were among breastfed infants and 72% were among formula fed infants (p<0.05).

Measure of benefits used in the economic analysis
The outcome measures used were quality-adjusted life-years (QALYs) for the cost-utility analysis and cost savings for the cost-effectiveness analysis.

Direct costs
Costs were discounted at a 5% rate when appropriate. Quantities and costs were not reported separately. The following cost items were calculated: costs related to the treatment of NEC, gastrointestinal illness, and eczema; and costs related to the treatment of IDDM. The quantity/cost boundary adopted was that of society. The estimation of quantities and
costs was based on actual data. Cost data were derived from the studies included in the review. The price year was not reported.

**Statistical analysis of costs**
Not reported.

**Indirect Costs**
Lifetime special educational costs were included.

**Currency**
US dollars ($).

**Sensitivity analysis**
No sensitivity analysis was performed.

**Estimated benefits used in the economic analysis**
Survivors of NEC were assumed to have a quality of life of 0.9. The cost savings are reported below.

**Cost results**
By increasing the nation-wide prevalence of exclusive breastfeeding from 60% to 80%, the total cost of illness related to NEC would fall from $8,054,323 to $5,369,549 in low birthweight babies (n=16,000) and from $3,565,882 to $2,397,232 in very low birthweight babies (n=3,300). The total costs related to gastrointestinal illness in term babies (n=240,000) would drop from $11,585,376 to $7,840,608. The total cost of illness related to eczema in low birthweight babies (n=16,000) would fall from $97,584 to $78,888, and in term babies (n=240,000) would fall from $4,066,944 to $3,122,832. Lifetime special educational costs would decrease by $31.2 million. Costs related to IDDM would fall by $144,000.

**Synthesis of costs and benefits**
Costs and effectiveness data were not combined into cost-effectiveness ratios. On the basis of a cheap and expensive model of breastfeeding, the cost per QALY for breastfeeding premature babies to prevent NEC was estimated to be $14.79 and $58.32, respectively.

**Authors' conclusions**
There is evidence that increasing the prevalence of breastfeeding may achieve further cost savings through reduction in the severity and duration of infant illness and through reduction in maternal absenteeism.

**CRD COMMENTARY - Selection of comparators**
The rationale for the choice of the comparator was clear.

**Validity of estimate of measure of effectiveness**
A range of effectiveness measures was used to evaluate the impact of breastfeeding on multiple illnesses over time. It was not indicated whether the list of outcome measures studied was exhaustive.

**Validity of estimate of costs**
The reported cost results are likely to be specific to each setting and study. It is not immediately clear whether cost results from different studies can simply be summed up to obtain a total cost estimate. The robustness and
generalisability of cost results was not examined by sensitivity analysis. Cost savings due to reductions in long-term morbidity due to NEC and IDDM, GP visits for gastrointestinal illness, and health service utilisation and social welfare costs due to neurodevelopmental impairment, and maternal absenteeism costs were not included.

Other issues
More details about the review process could have been provided. In particular, information on study design and setting is needed in order to assess the validity of effectiveness and cost results.

Implications of the study
Research studies focusing on rates of hospitalisation, duration of hospitalisation, health service utilisation and medication costs in breastfed and formula fed infants should be conducted. Such studies are likely to cast further light on the economic benefits of breastfeeding.

Source of funding
None stated.

Bibliographic details

Other publications of related interest

Indexing Status
Subject indexing assigned by CRD

MeSH
Bottle Feeding /economics /adverse effects; Breast Feeding; Child Health Services /utilization /economics; Cost Savings; Diabetes Mellitus, Type 1 /prevention & control; Eczema /prevention & control; Food, Formulated /economics; Gastrointestinal Diseases /prevention & control; Growth; Health Care Costs; Infant; Infant Food; Infant, Newborn; Intelligence; Length of Stay; Milk, Human /immunology; Office Visits /economics; Otitis Media /prevention & control; Quality-Adjusted Life Years

AccessionNumber
21997007370

Date bibliographic record published
31/07/1999

Date abstract record published
31/07/1999