A clinical and economic evaluation of enteral nutrition
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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 estimated the costs and clinical effectiveness of enteral nutrition (feeding by tube or catheter) compared with parenteral nutrition (intravenous feeding) and other therapies for the treatment of critically-ill patients in the USA. The authors concluded that use of enteral nutrition reduced the risks of severe non-fatal adverse events which translated into substantial resource savings. There were a few limitations to the study, so the authors’ conclusions should be considered with a degree of caution.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The study estimated the costs and effectiveness of greater use of enteral nutrition compared with parenteral nutrition and other therapies for the treatment of critically-ill adult patients in the USA.

Interventions
Enteral nutrition (defined as nutrition provided through the gastrointestinal tract via a tube, catheter or stoma delivering nutrients distal to the oral cavity) was compared with parenteral nutrition (defined as intravenous administration of nutrition via a central or peripheral line) and other therapies. Other therapies were grouped together and included oral feeding, intravenous feeding, oral feeding, no feeding, or a combination of feeding methods.

Location/setting
USA/secondary care.

Methods
Analytical approach:
The authors used a model to combine estimates of the outcomes of different methods of providing nutrition from systematic reviews. The perspective of the study was not stated.

Effectiveness data:
The effectiveness data came from the published literature and were identified by searching MEDLINE and EMBASE databases from 1995 up to 2010. Estimates from identified studies were combined using meta-analysis. The primary estimates of effectiveness were the risk of outcomes grouped as death, major and minor infection, and major and minor non-infectious events.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
The primary measure of benefit was the cost per event (for each category of outcome) and the expected cost savings.

Cost data:
The change in the costs of adverse events by complication category and length of hospital stay were included in the model. The cost estimates were based on estimates from the published literature and the national Agency for Healthcare Research Quality (AHRQ) database. Costs were scaled up to estimate aggregate estimates for the USA. All costs were reported in US $.
Analysis of uncertainty:
The authors did not conduct formal sensitivity analyses, but reported estimates with an upper and lower boundary based on the product of the bounds of the confidence interval of the risk estimate from the meta-analysis and the bounds of the cost estimates.

Results
Compared with parenteral nutrition, enteral nutrition was expected to result in total cost savings of $1,496 (range $205 to $3,663) per patient, with cost savings from major infections ($1,074) the main cost saving.

The reduction of resource use per patient associated with enteral nutrition compared with parenteral nutrition was estimated to be 1.18 (95% confidence interval 0.02 to 2.33) days of nutritional treatment, 1.61 (95% confidence interval 0.72 to 2.49) days in intensive care unit, 1.75 (95% confidence interval -0.58 to 2.93) days in hospital excluding intensive care unit, and 1.66 (95% confidence interval 0.95 to 2.37) days in total hospital stay.

The estimated annual savings were $57 million (range $33 to $82 million) if 10% of parenteral nutrition patients were switched to enteral nutrition or $0.5 billion if all parenteral nutrition patients were switched to enteral nutrition.

Authors' conclusions
The authors concluded that the use of enteral nutrition reduced risks of severe non-fatal adverse events which translated into substantial resource savings.

CRD commentary
Interventions:
The interventions were clearly described and appeared to be relevant to the study setting (USA). The authors reviewed American Society for Parenteral and Enteral Nutrition (ASPEN) guidelines, which suggested that the appropriate comparators for the study setting were included. However, these comparators may not be relevant to all settings. The grouping of the other therapies may not have been appropriate, as these appear to be a diverse group of feeding options.

Effectiveness/benefits:
The methods used to identify the effectiveness estimates were well reported. The authors appear to have used an extensive, transparent and methodologically-sound process to identify the best available evidence for the model. The authors also reviewed clinical guidelines alongside evidence from randomised clinical trials. The methods used to combine estimates from different studies were well described and appeared appropriate.

Costs:
The authors did not report the study perspective, but (from the categories of costs included in the analysis) it appears to been from a payer perspective. The relative cost of the different nutritional regimes did not appear to have been taken into account, so it was difficult to assess whether important cost drivers had been omitted. The time horizon and the price year of the analysis were not reported, so it was not clear whether discounting of costs would be required. The authors also did not report whether adjustments, such as inflation of costs to a specific year or discounting, had been conducted.

Analysis and results:
It was appropriate to compare the relative potential cost savings of the different nutritional strategies, but the grouping of the other therapies may not have been appropriate as these appear to be a diverse group of options. The authors considered uncertainty from a combination of parameter inputs, but this method may not be sufficient to fully characterise uncertainty around the parameter estimates, whereas probabilistic sensitivity analysis would have assessed the overall uncertainty in the results.

Concluding remarks:
There were a few limitations to the study, so the authors' conclusions should be considered with a degree of caution.

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