
Hospital resources consumed for surgical morbidity: effects of preoperative arginine and omega-3 fatty acid supplementation on costs

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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

The study examined the preoperative oral administration of a specialised diet containing arginine and omega-3 fatty acids. This specialised diet was delivered for 5 days prior to elective surgery in well-nourished patients with cancer of the gastrointestinal (GI) tract.

Type of intervention

Primary prevention.

Economic study type

Cost-effectiveness analysis.

Study population

The study population comprised well-nourished patients with GI tract cancer who were candidates for major elective surgery. The study did not report any further inclusion or exclusion criteria.

Setting

The setting was secondary care. The economic study was carried out in Italy.

Dates to which data relate

The effectiveness data referred to 2002, as did the resource use and unit cost data. The price year was also 2002.

Source of effectiveness data

The effectiveness data were derived from a single study.

Link between effectiveness and cost data

The resource use data were collected retrospectively from the same patient sample used in the effectiveness study.

Study sample

The present paper did not report power calculations or the method of sample selection. Readers interested in further information on the effectiveness study should refer to Gianotti et al. 2002 (see 'Other Publications of Related Interest' below for bibliographic details). The authors did not discuss whether the study sample was representative of the study population. The study included 305 patients, of whom 102 were randomised to preoperative supplementation, 101 to preoperative supplementation with postoperative jejunal infusion, and 102 to no supplementation. The 101 patients randomised to preoperative supplementation with postoperative jejunal infusion were not included in the economic analysis.

Study design

The study was a randomised controlled trial that was carried out in a single university hospital. The method of randomisation was not reported. The patients were followed up for the duration of their hospital stay. The authors reported that staff members not involved with the study were required to register postoperative complications and determine the day of discharge. However, it was not reported whether these members of staff were blind to treatment allocation. The authors stated that the economist who reviewed the resource use data was blind to the treatment assigned.

Analysis of effectiveness

The analysis of effectiveness was based on all patients included in the economic study. The primary health outcome used was freedom from postoperative complications. The groups were shown to be comparable at baseline in terms of their clinical and demographic characteristics.

Effectiveness results

Fifty-one patients (50%) receiving no supplementation were free from complications, compared with 64 patients (63%) receiving preoperative supplementation.

The authors stated that significant decreases were found in the number of patients developing postoperative infections and the mean length of hospital stay in both groups receiving nutritional supplementation in comparison with those receiving no supplementation, but they did not report the relevant p-values.

Clinical conclusions

The authors concluded that preoperative nutritional supplementation with arginine and omega-3 fatty acids is effective in reducing postoperative complications and morbidity.

Measure of benefits used in the economic analysis

No summary measure of health benefit was used in the economic analysis. In effect, a cost-consequences analysis was performed.

Direct costs

The authors did not report the resource use quantities separately from the costs, which limits the generalisability of the study results. The study included direct costs to the hospital in terms of length of stay, laboratory and microbiology analysis, surgical and therapeutic interventions, medical, technical and diagnostic services, medication and outpatient follow-up consultations. The resource use data were extracted from medical charts, and an attempt was made to include only resource use directly related to the treatment of complications. The unit cost data were derived from national databases and current prices. The time horizon for the analysis was not stated explicitly but it might have been less than one year, in which case the lack of discounting is appropriate. The study reported the average costs for the price year 2002.

Statistical analysis of costs

A non-parametric bootstrapping method was used to generate 30,000 re-samples for statistical analysis. This method creates an empirical distribution for analysis that should reflect the skewness apparent in the cost data. The cost data were displayed in bar charts with error bars, and mean estimates with 95% confidence intervals (CIs) were provided. The method used to calculate the 95% CIs was not reported, nor were the types of hypothesis tests used to generate p-values.

Indirect Costs

The indirect costs were not included in the analysis, which was appropriate given the hospital perspective.

Currency

Euros (EUR).

Sensitivity analysis

The authors performed a sensitivity analysis to assess the impact of excluding non-surviving patients. Two patients were censored for death, one in the preoperative supplementation group and one in the no supplementation group.

Estimated benefits used in the economic analysis

See the 'Effectiveness Results' section.

Cost results

The authors reported the mean costs of patients without complications according to their surgery type. However, overall, the mean costs per patient without complications were EUR 3,622 for those receiving no supplementation and EUR 3,581 for those receiving preoperative supplementation.

The mean costs of patients with complications were EUR 10,494 in patients receiving no supplementation and EUR 8,793 in patients receiving preoperative supplementation.

The total cost per patient, including the costs of nutrition, was EUR 3,122 without supplementation and EUR 1,872 with supplementation. This difference was found to be statistically significant, ($p=0.04$).

Synthesis of costs and benefits

Not relevant.

Authors' conclusions

Preoperative nutritional supplementation with arginine and omega-3 fatty acids may be the dominant treatment option in well-nourished patients who are candidates for major gastrointestinal (GI) surgery for cancer.

CRD COMMENTARY - Selection of comparators

The authors performed a trial-based economic evaluation, so the comparators were determined in part by the design of the effectiveness study. However, the authors chose to omit one treatment arm that included preoperative nutrition and postoperative infusion, as this was assumed to be dominated by the equally effective arm including only preoperative nutrition. You must consider whether the proposed intervention and control arms from the effectiveness study represent widely used technologies in your own setting.

Validity of estimate of measure of effectiveness

The effectiveness data were derived from a single study. The analysis was based on a randomised trial, which was appropriate for the study question. However, there may be some doubt as to whether the staff members responsible for identifying complications were blind to treatment allocation, thus there is the potential for bias in the chosen outcome measure. The authors stated that the study population was very specific and that the results are unlikely to be generalisable to other populations, such as malnourished patients. The patient groups were shown to be comparable at analysis. The analysis of effectiveness appears to have been handled credibly since all patients included in the trial were accounted for in the analysis.

Validity of estimate of measure of benefit

The authors did not derive a measure of health benefit. The analysis was, in effect, a cost-consequences analysis.

Validity of estimate of costs

The authors stated that they conducted the analysis from the perspective of the hospital in which the effectiveness study was conducted. They stated that the results might not be generalisable to hospitals with different case-mix, surgical experience, complication rates and scales. The authors attempted to exclude resource use that was not directly related to the treatment of complications, but it was unclear how this was defined or achieved. This may introduce some uncertainty into the validity of the resource use estimates. However, since an economist who was blind to the treatment allocation calculated resource use, this should not bias the study results in favour of any alternative. The costs and the quantities were not reported separately, which limits the ability of readers to assess the generalisability of the study results to their own setting. The prices were derived from the authors' setting and a statistical analysis was not conducted. The time horizon for the analysis was unclear, but since it was likely to have been less than one year discounting was not relevant. The authors reported the price year (2002).

Other issues

The authors made appropriate comparisons of their findings with those from other studies, particularly studies in the field of enteral nutrition. The issue of generalisability to other settings was addressed in some detail. The authors do not appear to have presented their results selectively and their conclusions stay within the scope of the analysis.

Implications of the study

The authors did not make any recommendations for further research.

Source of funding

None stated.

Bibliographic details

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Other publications of related interest

Gianotti L, Braga M, Nespoli L, et al. A randomized controlled trial on pre-operative oral supplementation with a specialized diet in patients with gastrointestinal cancer. *Gastroenterology* 2002;122:1763-70.

Indexing Status

Subject indexing assigned by NLM

MeSH

Arginine /administration & dosage; Cost-Benefit Analysis; Dietary Supplements /economics; Fatty Acids, Omega-3 /administration & dosage; Female; Gastrointestinal Neoplasms /surgery; Health Resources /economics /utilization; Hospital Costs /statistics & numerical data; Humans; Immunotherapy /economics /methods; Length of Stay /economics; Male; Middle Aged; Postoperative Complications /economics /epidemiology /mortality; Preoperative Care /economics

/methods /standards; Randomized Controlled Trials as Topic

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