Percutaneous endoscopic gastrostomy reduces total hospital costs in head injured patients

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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 health technology studied was feeding gastrostomy techniques. Percutaneous endoscopic gastrostomies (PEGs), performed in either the intensive care unit (ICU) or endoscopy suite, were compared with surgical gastrostomies (OPEN) in providing enteral access for nutritional needs in patients with traumatic brain injuries (TBI). Surgical gastrostomies were performed typically using the Stamm technique. PEGs were performed by established techniques using a commercially available kit.

Type of intervention
Rehabilitation.

Economic study type
Cost-effectiveness analysis.

Study population
The study population consisted of patients who suffered head injuries and required a gastrostomy.

Setting
The setting was hospital. The economic analysis was conducted at the University of Pittsburgh, Pennsylvania, USA.

Dates to which data relate
Effectiveness data were collected from July 1990 to July 1996. Price years were not reported.

Source of effectiveness data
Effectiveness data were derived from a single study.

Link between effectiveness and cost data
Costing was undertaken retrospectively on the same group as that used in the effectiveness study, but complete data were available for only 93 patients (70%).

Study sample
No power calculations were reported. Between 1 July 1990 and 1 July 1996, 132 patients were eligible and underwent placement of a gastrostomy tube. Eighty-eight patients underwent OPEN gastrostomy and 44 patients underwent PEG. 12 PEG tubes were placed in the OR, 13 were placed in the endoscopy suite, and 19 were placed in the ICU. It was not stated whether any patients refused to participate or were excluded from the initial study sample for any reason.
**Study design**
This was a retrospective cohort study, conducted in 44 hospital departments. The technique for gastrostomy was selected at the discretion of the attending surgeon. The duration of follow-up was not stated. No loss to follow-up was reported.

**Analysis of effectiveness**
It appears that all patients included in the initial study sample were taken into account in the effectiveness analysis. The primary health outcomes used in the analysis were the number of complications, the number of deaths, and the discharge disposition. At baseline, the two groups were shown to be comparable with respect to age (36 +/-17 in the OPEN group versus 41 +/-20 years in the PEG group), initial Glasgow coma score (5.0 +/-2.6 versus 5.2 +/-3.7), number of associated injuries (69% versus 75%), and types of associated injuries.

**Effectiveness results**
The percentage of patients who had complications following PEG (5%) was similar to that after OPEN gastrostomies (7%).

Qualitatively, however, the complications in patients with PEGs differed from those in patients who underwent OPEN gastrostomies. In the PEG group one patient had his PEG tube inadvertently removed, whilst another had the internal button of the PEG break during an attempt at removal. In the OPEN group 6 patients experienced complications; 3 had surgical wound infections, 1 had the gastrostomy tube inadvertently dislodged (and it couldn't be replaced), 1 had a perforation of the duodenum from the transpyloric portion of the tube, and 1 patient developed a chronic gastrocutaneous fistula.

The number of patients who died was similar between the groups (4 (9%) in the PEG group and 5 (6%) in the OPEN group). The discharge disposition between the groups was similar.

**Clinical conclusions**
PEGs were a reliable method of obtaining long-term enteral access with complication and death rates equivalent to Stamm gastrostomies. Thus the two interventions were considered equivalent with respect to the effectiveness outcomes.

**Measure of benefits used in the economic analysis**
The authors did not develop a summary benefit measure. The analysis was based upon the effectiveness equivalence of rehabilitation alternatives. The economic analysis therefore included only costs and a cost-minimisation analysis (CMA) was performed.

**Direct costs**
Total hospital costs were estimated. Hospital costs included the cost of acute care for the TBI and placement of the gastrostomy, and the treatment costs of short-term complications related to gastrostomy including complications not identified in the medical record. The cost/resource boundary adopted in the study was that of the hospital and hospital department charges were obtained from the hospital's computerised database. Cost-to-charge ratios were used to estimate hospital costs. Costs and quantities were not reported separately. Discounting was not performed because costs per patient were incurred over a short period of time. The estimation of resource use was based on data derived from the same patient charts as those used in the effectiveness analysis but data were available for only 93 patients: 51 patients in the OPEN group, 11 patients who underwent PEGs in the endoscopy suite, and all patients who underwent PEGs either in the OR (n=12) or in the ICU (n=19). The authors also examined whether procedures performed in association with the gastrostomy could account for the substantial increase in the total hospital costs seen with OPEN gastrostomies and PEGs in the OR.
Statistical analysis of costs
Data on total hospital cost were analysed using the Kruskal-Wallis test for non-parametric data. Pair-wise comparisons between groups were then performed by analysis of variance followed by Fisher's post hoc test, (p<0.05).

Indirect Costs
No indirect costs were reported.

Currency
US dollars ($).

Sensitivity analysis
No sensitivity analysis was carried out.

Estimated benefits used in the economic analysis
Please refer to the effectiveness results above.

Cost results
The total hospital cost for patients who had OPEN gastrostomy ($119,811 +/-69,130) was significantly greater than that for patients who had PEGs ($89,200 +/-57,670, p<0.05 by student t test).

Total hospital costs were significantly reduced for patients who underwent PEG either in the ICU or in the endoscopy suite compared with patients who had gastrostomy (OPEN or PEG) in the OR.

With and without a concurrent tracheostomy, the total hospital costs were similar for patients who had OPEN gastrostomies (with tracheostomy, $117,696 +/-60,020; without tracheostomy $116,569 +/-78,071), PEGs in the ICU (with tracheostomy, $80,332 +/-54,650 and without tracheostomy, $74,555 +/-35,078), or PEGs in the OR (with tracheostomy, $141,463 +/-87,073 and without tracheostomy, $84,367 +/-19,945).

Synthesis of costs and benefits
Not applicable as a cost-minimisation analysis was conducted.

Authors' conclusions
The authors concluded that a PEG in either the ICU or endoscopy suite is the preferred method for obtaining long-term enteral access in this patient population, with a complication rate equivalent to Stamm gastrostomies and significantly lower total hospital costs.

CRD COMMENTARY - Selection of comparators
A justification was given for the comparator used, namely surgical gastrostomy, which represented the standard approach used for the provision of enteral access for nutritional needs in patients with TBI. You, as a user if this database, should consider whether this is a widely used technology in your own setting.

Validity of estimate of measure of effectiveness
The analysis was based on a retrospective cohort study but a randomised controlled study would have been a more appropriate design for the study question. Limited data on effectiveness were reported. No statistical analyses were carried out to take account of potential biases and confounding factors, although the authors stressed that patient groups were comparable at baseline. The sample is likely to have been representative of the study population. The method of
sample selection was not clearly stated and it was not clear whether some patients were excluded from the study sample. Power calculations were not reported and no evidence concerning the appropriate sample size was provided. These issues tend to limit the internal validity of the analysis. The measure of primary health outcomes was likely to be valid.

**Validity of estimate of measure of benefit**

The authors did not derive a summary measure of health benefit. It is likely that the effectiveness analysis was based upon the health outcomes equivalence of alternative procedures. The analysis was therefore classified as a cost-minimisation analysis (see validity of effectiveness comments above).

**Validity of estimate of costs**

The perspective adopted was not clearly stated, but it is likely to have been that of the hospital. Few details on cost data were reported. Consequently, there is uncertainty as to whether all relevant costs were included in the analysis. A statistical analysis of costs was carried out. Costs and quantities were not reported separately. Cost-to-charge ratios were used. The price years were not reported, thus making reflation exercises in other settings difficult. Discounting is likely not to have been necessary due to the fact that patients were not followed after hospital discharge.

**Other issues**

The authors did make appropriate comparisons of their findings with those from other studies but the issue of generalisability of their results to other settings was not explicitly addressed and sensitivity analyses were not conducted. As a consequence, the external validity of the analysis was low. The results do not appear to have been presented selectively. The study enrolled patients with head injuries and this was reflected in the authors' conclusions. The authors reported further limitations of their study: too much attention was paid to reducing costs and not enough to measuring a role for open gastrostomy in the population studied. The authors did not consider other feeding rehabilitation alternatives, such as the percutaneous placement of a fluoroscopically guided catheter (PFGC).

**Implications of the study**

Neither recommendations for nor requirement for future research were reported. However, the authors stated that although PEG proved to have been a valid approach for obtaining long-term enteral access among patients with TBI, there is still a role for open gastrostomy in the patient population considered in the study.

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None stated.

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**Other publications of related interest**


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