Modelling the costs and consequences of treating paediatric faecal impaction in Australia

Guest J F, Clegg J P

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 use of macrogol 3350 plus electrolytes for the treatment of paediatric faecal impaction. Macrogol 3350 could be administered in an inpatient or an outpatient setting.

Type of intervention
Treatment.

Economic study type
Cost-utility analysis.

Study population
The study population comprised a hypothetical cohort of children aged between 4 and 11 years with faecal impaction.

Setting
The setting was inpatient and outpatient. The economic study was carried out in Australia.

Dates to which data relate
The effectiveness data were derived from studies published between 1982 and 2004. No dates for resource use were reported, but such data were mainly derived from interviews with clinicians in Australia. The costs were expressed using 2003/04 prices.

Source of effectiveness data
The effectiveness evidence was derived from a synthesis of published studies.

Modelling
A decision-tree model was constructed to assess the clinical and economic impact of the alternative treatments for paediatric faecal impaction in a hypothetical cohort of children. The whole structure of the decision tree was reported. Patients received initial treatment that could consist of macrogol 3350 (inpatient or outpatient), enemas/suppositories, manual evacuation or NGA-PEG. Children could achieve disimpaction and then receive maintenance therapy for 12 weeks, or not achieve disimpaction and receive an alternative treatment. The model considered a variety of laxatives during the 12-week period post-disimpaction.

Outcomes assessed in the review
The outcomes estimated in the review were the probability of disimpaction and the rates of re-impaction. The utility values associated with healthy children and children with constipation were also assessed.
Study designs and other criteria for inclusion in the review
A review of the literature was undertaken to identify primary studies. Inclusion and/or exclusion criteria were not reported. There was no information on the studies that provided the clinical data.

Sources searched to identify primary studies
Computerised databases such as MEDLINE, EMBASE, HealthSTAR, Current Contents, NHS EED and the Cochrane Library. A manual search was also performed, and this was based on the references of retrieved studies.

Criteria used to ensure the validity of primary studies
Not reported.

Methods used to judge relevance and validity, and for extracting data
Not reported.

Number of primary studies included
Seven primary studies provided the clinical data.

Methods of combining primary studies
Not reported.

Investigation of differences between primary studies
An algorithm was developed to adjust the utility values for constipation among adults to that for children.

Results of the review
The probability of disimpaction was 92% (within 6 days) with oral macrogol 3350, 79% (within 8 days) with enemas or suppositories, 100% (within 5 days) with manual evacuation, and 100% (within 2 days) with NGA-PEG.

The probability of re-impaction was 89% when maintenance was based on senna and 23% when maintenance was based on lactulose with 31% of senna (regardless of the initial treatment received).

All children were expected to be disimpacted within 14 days of starting treatment, regardless of the treatment received.

The utility value was 0.94 for healthy children and 0.70 for children with constipation.

Measure of benefits used in the economic analysis
The summary benefit measure used was the expected number of quality-adjusted life-years (QALYs). The utility values were estimated using data from the literature and using an algorithm. The QALYs were based on a 12-week time horizon. The range in time to disimpaction was also reported.

Direct costs
The analysis of the costs was conducted from the perspectives of the Australian Commonwealth and the parents. Commonwealth costs included the direct medical costs associated with outpatient physician visits, outpatient nurse visits, hospitalisations, and diagnostic and laboratory tests. Parents’ costs included only laxatives prescribed to outpatients pre- and post-disimpaction. The unit costs and the quantities of resources used were presented separately. Resource consumption was based on data derived from interviews with 14 Australian clinicians. The costs came from typical Australian sources, including the Manual of Resources, the Australian diagnosis-related group (DRG) and...
retail prices. The costs were expressed using 2003/04 prices. Discounting was not relevant as the costs were incurred during a short timeframe.

**Statistical analysis of costs**
The costs were treated deterministically in the base-case.

**Indirect Costs**
The indirect costs were not considered.

**Currency**
Australian dollars (AUD).

**Sensitivity analysis**
Univariate sensitivity analyses were carried out to determine the impact of individual model inputs on the total costs. The ranges used were probably based on authors’ opinion. An extensive probabilistic sensitivity analysis was also performed by simultaneously varying all probabilities, utilities, resources used and unit costs in a Monte Carlo simulation (1,000 iterations). Probabilities were varied according to beta distributions, while resource estimates and costs were varied according to normal distributions.

**Estimated benefits used in the economic analysis**
The expected QALYs at 12 weeks post-disimpaction were 0.20 (95% confidence interval, CI: 0.17 to 0.23), irrespective of treatment for disimpaction and subsequent maintenance.

The sensitivity analysis suggested that the base-case QALYs were robust.

The range in time to disimpaction ranged from:

- 4.3 to 8.4 days with oral macrogol 3350 in the inpatient setting,
- 4.1 to 8.4 days with oral macrogol 3350 in the outpatient setting,
- 2.7 to 12.1 days with enemas or suppositories,
- 3.1 to 6.1 days with manual evacuation, and
- 0.2 to 4.0 days with NGA-PEG.

**Cost results**
The total costs from the Commonwealth perspective were AUD 3,931.11 with oral macrogol 3350 (inpatient), AUD 757.72 with oral macrogol 3350 (outpatient), AUD 2,124.94 with enemas or suppositories, AUD 4,477.98 with manual evacuation, and AUD 1,838.29 with NGA-PEG.

The authors pointed out that resource consumption associated with maintenance therapy was comparable among treatment groups. Thus, the expected Commonwealth cost was affected only by the initial disimpaction treatment that was the main category of costs for all treatments (91% for oral macrogol 3350 inpatient, 68% for oral macrogol 3350 outpatient, 89% for enemas or suppositories, 95% for manual evacuation, 87% for NGA-PEG).

From the perspective of the parents, the costs were comparable across treatments. The costs were AUD 89 with oral macrogol 3350 (inpatient), AUD 104 with oral macrogol 3350 (outpatient), AUD 112 with enemas or suppositories, AUD 94 with manual evacuation, and AUD 91 with NGA-PEG.
The probabilistic sensitivity analysis showed that, in general, outpatient macrogol 3350 can be delivered at costs lower than those associated with the other treatments. In particular, total costs from the Commonwealth perspective ranged from:

AUD 2,402 to AUD 5,508 with oral macrogol 3350 in the inpatient setting,

AUD 396 to AUD 1,205 with oral macrogol 3350 in the outpatient setting,

AUD 1,408 to AUD 2,909 with enemas or suppositories,

AUD 2,965 to AUD 5,878 with manual evacuation, and

$1,183 to AUD 2,508 with NGA-PEG.

The univariate sensitivity analysis revealed that the Commonwealth costs associated with enemas or suppositories were affected by changes in probability values and DRG costs.

Synthesis of costs and benefits
A synthesis of the costs and benefits was not relevant. A cost-minimisation analysis was carried out since the alternative treatments produced the same benefits.

Authors’ conclusions
Three main conclusions about the relative cost-effectiveness of alternative treatments for children with faecal impaction were drawn. First, the level of health gain was expected to be the same irrespective of treatment modality. Second, the expected cost of laxatives to parents was the same. Third, from the perspective of the Australian Commonwealth, the use of oral macrogol 3350 in an outpatient setting afforded the least expensive treatment since the children were not hospitalised. Therefore, oral macrogol 3350 was the most cost-effective strategy.

CRD COMMENTARY - Selection of comparators
The authors justified the choice of the comparators, which were appropriate given that they represented conventional treatments for paediatric faecal impaction. The treatment patterns in post-disimpaction management were based on the opinion of clinical experts. You should decide whether they are valid comparators in your own setting.

Validity of estimate of measure of effectiveness
The effectiveness data were derived from published studies, which were identified from a review of the literature. Details of the sources searched were reported, but the design and other characteristics of the primary studies were not described. Therefore, it was not possible to assess the validity of the clinical data used in the model. Further, the authors did not report the approach used to extract and then combine the primary estimates. The issue of heterogeneity in the primary studies was not addressed. A probabilistic sensitivity analysis was carried out to deal with the issue of uncertainty in the assessment of the clinical data.

Validity of estimate of measure of benefit
QALYs were the most appropriate benefit measures because they capture the impact of the intervention on quality of life, which is the most relevant dimension of health for children with faecal impaction. Details of the instruments used to derive the utility were not reported. The use of QALYs enables comparisons with the benefits of other health care interventions. The calculation of QALYs was restricted to the 12-week treatment period.

Validity of estimate of costs
The analysis of the costs was consistent with the choice of the perspectives adopted in the study. Extensive information on the unit costs, quantities of resources used, price year and sources of the costs was reported, which will
facilitate replication of the analysis and refiation exercises in other settings and time periods. Treatment patterns for children with faecal impaction were derived from interviews with clinicians. Statistical analyses of the costs were performed in the sensitivity analysis, in which probabilistic distributions were assigned to both unit costs and resources used. Overall, the cost analysis was carried out satisfactorily.

Other issues
The authors stated that the review of the literature did not find any economic evaluations of alternative treatments for paediatric faecal impaction. Thus, the current study is likely to have been the first pharmacoeconomic study in this area. Comparisons were therefore made only for single aspects of the analysis (e.g. hospitalisation rates, unit costs). The issue of the generalisability of the study results to other settings was implicitly addressed in the sensitivity analysis, since the impact of alternative values for clinical and economic data was investigated in a probabilistic framework. The authors noted some limitations of their analysis, such as the short time horizon, the use of expert opinion to derive resource consumption, and the uncertainty in some clinical data.

Implications of the study
The study results suggested that oral macrogol 3350 is an effective and efficient treatment for paediatric faecal impaction. Oral macrogol 3350 in the outpatient setting improves clinical symptoms without causing distress to children and without leading to re-impaction.

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Other publications of related interest


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MeSH
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