Cost-effectiveness of Helicobacter pylori eradication for the long-term management of duodenal ulcer in Canada


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
Eradication of Helicobacter pylori (H. pylori) for confirmed but uncomplicated duodenal ulcer.

Type of intervention
Treatment

Economic study type
Cost-effectiveness analysis.

Study population
Patients with confirmed (by endoscopy) and uncomplicated duodenal ulcer.

Setting
Primary care/hospital. The economic study was carried out in Canada.

Dates to which data relate
The effectiveness analysis was based on studies published during the period 1978-1991. Prices used are 1993.

Source of effectiveness data
Based on a review/synthesis of previously completed studies.

Modelling
A decision analysis model was used in estimating costs and benefits.

Outcomes assessed in the review
Ulcer recurrence rates.

Study designs and other criteria for inclusion in the review
Randomised double-blind controlled trials in adults in whom ulcer recurrence was endoscopically determined at 6 and/or 12 months. Studies that reported placebo data at 6 and/or 12 months were also included.

Sources searched to identify primary studies
Medline.
Criteria used to ensure the validity of primary studies
Double-blind trials were selected.

Methods used to judge relevance and validity, and for extracting data
Methods used to judge relevance and validity were not stated. The individual data was used to extract data from the primary studies.

Number of primary studies included
12 trials met the inclusion criteria for placebo recurrence in 0-6 months; four of these also reported on recurrence in 6-12 months. 5 trials of continuous maintenance ranitidine therapy reported recurrence rates at 6 months and 2 at 12 months. 4 trials of patients who had undergone H pylori eradication treatment were included.

Methods of combining primary studies
A pooled rate of ulcer recurrence was estimated with associated 95% confidence intervals over all studies. Each study observation was weighted by the inverse of its variance.

Investigation of differences between primary studies
Not stated.

Results of the review
The pooled rate of recurrence in 0-6 months with placebo was 65.4% (95% CI, 60.3 to 70.4); recurrence in 6-12 months was 33.9% (95% CI, 18.2 to 49.6). For continuous maintenance ranitidine therapy in 0-6 months the pooled recurrence rate was 12.8% (95% CI, 9.4 to 16.2); in 6-12 months, the pooled rate was 5.7% (95% CI, 0 to 12.6). For patients who had successfully undergone H pylori eradication the rate of recurrence in 0-12 months was 3.7% (95% CI, 0 to 7.5). It was taken from the literature that in 16% of patients h pylori eradication would be unsuccessful.

Measure of benefits used in the economic analysis
Duodenal ulcer recurrence avoided, calculated using a decision analysis model.

Direct costs
All health service costs were included. Drug costs were based on prices from a national audit and represented drug ingredient costs plus dispensing fees. An expert physician panel (using a Delphi study) derived estimates and ranges on the percentage likelihood and volume of various services when patients present with symptoms of ulcer recurrence. Hospital procedure prices were estimated from two sources: (1) a corporate cost model for hospitals in Ontario, Canada (2) the physician fee schedule for Ontario. Quantities and costs were analysed separately. Final costs were calculated using a decision analysis model. Costs were expressed in 1993 prices.

Currency
Canadian dollars (Can$).

Sensitivity analysis
Sensitivity analyses were reported based on 95% CI around recurrence rates, and on uncertain variables used in estimating resource costs.
Estimated benefits used in the economic analysis
Among the 'A' strategies (heal and wait) the two strategies (A3, A4) in which H. pylori eradication is attempted at first recurrence have the lowest rate of symptomatic recurrence (62/100 patients, range 55-69). The two 'heal and eradicate now' strategies (C1, C2) are more effective than all heal and wait (A) strategies with 15 symptomatic recurrences per 100 patients for 1 year. This outcome is equivalent to maintenance ranitidine therapy (B).

Cost results
Among the 'A' strategies A3, A4 have a higher 1-year expected cost per patient (Can$456 and Can$445). Continuous maintenance ranitidine therapy (B) has a 1-year cost of Can$386 compared to Can$272 (C1) and Can$253 (C2) for the 'heal and eradicate now strategies'.

Synthesis of costs and benefits
On the basis of both effectiveness (symptomatic duodenal ulcer recurrence avoidance) and cost, the two strategies (C1, C2) of immediate H. pylori eradication are dominant, (less costly with a better or same outcome), over all other strategies. Sensitivity analyses suggested that the rank ordering of strategies based on outcomes is robust. Analyses on uncertain variables used in estimating resource costs suggest that the model is most sensitive to the price of ranitidine: if brand-name Zantac is prescribed then the annual cost for the maintenance ranitidine strategy becomes the most costly.

Authors' conclusions
The authors concluded that for persons with duodenal ulcer, early attempts to eradicate H. pylori are recommended.

CRD Commentary
This was a thorough and well designed meta-analysis/decision model. There are, however, a number of additional points which should be noted. Information on side effects was not included in the model and the authors suggest that these would be minor, although they note that quality of life or patient preference data is required. Patient non-compliance was another issue which the authors raise as having not been included in the model as there was no reliable evidence relating compliance to efficacy. As the model only included patients who have had an endoscopically verified ulcer and are uncomplicated in their disease presentation, the results cannot be extrapolated to the much larger issue of non-ulcer dyspepsia and H pylori infection. However, the inclusion of indirect costs and complicated ulcer cases in their analysis, then the dominance of immediate H pylori eradication could be expected to have been even greater. One further area which requires discussion is the 84% success rate for H. pylori; it is uncertain whether such a rate is obtainable in clinical practice.

Implications of the study
It is not only clinically appropriate but also economically appropriate to treat patients with H. pylori-associated duodenal ulcer disease with an antimicrobial regimen.

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Other publications of related interest

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