Costs of duodenal ulcer therapy with antibiotics
Sonnenberg A, Townsend W F

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
Duodenal ulcer (DU) management by histamine2 antagonists, selective vagotomy and antibiotics.

Type of intervention
Secondary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
1000 hypothetical patients with active but uncomplicated ulcers.

Setting
Hospital/primary care. The economic study was carried out in the USA.

Dates to which data relate
Effectiveness data were derived from studies published between 1990 and 1994. Resource costs were obtained from 1993 data. 1993 prices were used.

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

Modelling
A Markov chain decision model was used to estimate final costs and outcomes.

Outcomes assessed in the review
Main transition probabilities included in the model were: a) healing rate of duodenal ulcer with histamine2 antagonist; b) healing rate of duodenal ulcer with antibiotic plus antisecretory drugs; c) recurrence rate of duodenal ulcer under persistent H pylori infection; d) recurrence rate in patients taking H2 antagonists; e) recurrence rate after selective vagotomy.

Study designs and other criteria for inclusion in the review
A meta-analysis, a RCT and other, unspecified studies. No inclusion or exclusion criteria were stated.
Sources searched to identify primary studies
Not stated.

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

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

Number of primary studies included
It seems that four primary studies were included:

(1) a meta-analysis (efficacy of antibiotics in eliminating H pylori)
(2) an efficacy and side-effect study of triple drug regimens in eliminating H pylori
(3) a curative study of duodenal ulcers after H pylori elimination
and (4) an RCT analysis of amoxicillin with omeprazole versus triple therapy for H pylori elimination in duodenal ulcer disease.

Methods of combining primary studies
Not applicable since each study provided information for different outcomes.

Investigation of differences between primary studies
Not stated.

Results of the review
Healing rate of duodenal ulcer with histamine2 antagonists was 77%; healing rate of DU with antibiotic plus antisecretory drugs was 95%; spontaneous recurrence rate of duodenal ulcer under persistent H pylori infection was 8.5%; recurrence rate of duodenal ulcer in patients taking H2 antagonists was 2.5%; recurrence rate after highly selective vagotomy was .25%.

Measure of benefits used in the economic analysis
The measure of benefit was the time spent free of duodenal ulcer complications. A Markov chain model was adopted and justified as an extension of two previously published, similar models. The authors’ assumptions were used to assess the health states of the hypothetical patients.

Direct costs
Costs and quantities were discounted at 3% per annum. Direct health service costs were used. Drug costs were estimated from average wholesale prices plus $5 per prescription (1993). Elective vagotomy and hemigastrectomy costs were estimated from the US average of charges allowed by the Health Care Financing Administration in 1992; Physician services and upper gastrointestinal tract endoscopy with biopsy in outpatients’ department were estimated from the Medical College of Wisconsin (1993). Duration of costs was 15 years. Final costs were calculated using a Markov chain model.
**Indirect Costs**
Costs and quantities were reported separately. These were estimated using the US average annual income figures (1993). Absenteeism from work was assumed during elective vagotomy, hemigastrectomy and ulcer relapse. Postoperative syndromes of Visick grade 4 resulted in a 10% loss in earnings over 15 years (discounted at 3% per annum). Death carried an income loss of 15 years discounted at 3% per annum. Final costs were estimated using a Markov chain model.

**Currency**
US dollars ($).

**Sensitivity analysis**
One-way sensitivity analysis showed the effects of varying single components in the Markov model which included: varying the H pylori reinfection rate, the H pylori eradication and healing rates, active ulceration healing from treatment with antimicrobials, and therapy eradication rates using two antibiotics with either bismuth or amoxicillin plus omeprazole.

**Estimated benefits used in the economic analysis**
The following results indicate the percentages of individual's time taken up with duodenal ulcer complications according to treatment received: 0.3% (antibiotic therapy); 3.4% (maintenance therapy); 5.6% (vagotomy); 10.6% (intermittent therapy); 17.2% (no therapy).

**Cost results**
Over a 15 year period (discounted at 3%), the following therapeutic costs were registered: $995 (antibiotics); $10350 (intermittent therapy with histamine antagonists); $11,186 (maintenance therapy with H2 antagonists); $17661 (vagotomy).

The sensitivity analysis showed that adding the cost of gastrointestinal tract endoscopy raised costs of antibiotics to $2426 (in order to verify the eradication of H pylori). Increasing the rate of infection from 1% to 10% raised costs of antibiotics to $3431. Decreasing H pylori eradication rates increased costs to $2679.

**Synthesis of costs and benefits**
The treatment with antibiotics was the dominant strategy.

**Authors' conclusions**
H pylori antibiotic treatment is both the cheapest and the most effective therapy, with a low probability of side-effects (in line with previous clinical trial results), and both lower direct and indirect costs.

**CRD Commentary**
1) Stated study design inclusion criteria in the review would have been helpful, as would the search strategy used to identify the studies.

2) The study looked at the indirect costs which are particularly useful in this case for modelling the true costs of treatment.

3) Overall, the cost analysis was well conducted.

**Implications of the study**
The use of antibiotic therapy is the most cost-effective way of treating duodenal ulcers due to Helicobacter pylori infection.

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