Eradication of Helicobacter pylori: an objective assessment of current therapies  
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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  
Eradication of helicobacter pylori with the following combinations of antibiotics: dual therapies: (1) omeprazole plus amoxycillin, (2) omeprazole plus clarithromycin; standard triple therapy: (3) bismuth plus tetracycline plus metronidazole, (4) bismuth plus tetracycline plus metronidazole plus omeprazole; proton pump inhibitor triple therapy: (5) omeprazole plus amoxycillin plus metronidazole, (6) omeprazole plus amoxycillin plus clarithromycin, (7) omeprazole plus clarithromycin plus tinidazole.

Type of intervention  
Treatment.

Economic study type  
Cost-effectiveness analysis.

Study population  
Patients with Helicobacter pylori infection. This condition applies to one-third of individuals in the Western world and most of the population in underdeveloped countries.

Setting  
Primary and secondary care. The economic study was carried out in Glasgow, UK.

Dates to which data relate  
Effectiveness data was taken from studies published between January 1990 and October 1995. The resource and price dates were not clearly reported.

Source of effectiveness data  
Synthesis of previously completed studies.

Outcomes assessed in the review  
The outcomes assessed were the eradication rate, and overall and serious side-effect rates.

Study designs and other criteria for inclusion in the review  
Randomized controlled trials made up about 50% of the total number of studies included. The abstracts or papers were included in the analysis after meeting the following criteria: a) the health technologies investigated were (1) standard triple therapy consisting of bismuth plus a nitromidazole plus either amoxycillin or tetracycline (with or without anti-secretory drugs); (2) dual therapy with an anti-secretory drug (either proton pump inhibitors or H2-receptor antagonists) plus either amoxycillin or clarithromycin; (3) triple therapy with an anti-secretory drug (either proton pump inhibitors
or H2-receptor antagonists) plus any two of amoxicillin, clarithromycin or a nitromidazole; b) only primary studies were included; c) adequate data; d) regimens were specified; e) individual primary study results presented in synthesis of two or more studies; f) no duplicated studies; g) assessment of H. pylori status at least one month after stopping eradication therapy.

**Sources searched to identify primary studies**
A Medline search was carried out in conjunction with a manual search of abstracts reporting the results of eradication therapies for the period 1992-1995, from meetings of the British Society of Gastroenterology, the American Association of Gastroenterology, the United European Gastroenterology Week, the World Congress of Gastroenterology, and the Annual International H. pylori meetings.

**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**
Three-hundred and fifty-two (352) studies were included in the analysis (from more than 1,500 publications examined). More than 50% of the studies included were RCTs.

**Methods of combining primary studies**
The primary study results were combined by weighting each result by its corresponding sample size.

**Investigation of differences between primary studies**
Differences were investigated in terms of measures of patient compliance and the study designs used (random versus nonrandom patient allocation).

**Results of the review**
The eradication rates, overall side effects, and serious side-effects were estimated to be as follows:

1. omeprazole 40 mg/day + amoxicillin 2 g/day, 60%, 14%, and 2%, respectively;
2. omeprazole 40 mg/day + clarithromycin 1 mg/day, 68%, 26%, and 3%, respectively;
3. bismuth 480 mg/day + tetracycline 2 g/day + metronidazole 1.2 g/day, 78%, 40%, and 4%, respectively;
4. bismuth 480 mg/day + tetracycline 2 g/day + metronidazole 1.2 g/day + omeprazole 40 mg/day, 86%, 40%, 4%, respectively;
5. omeprazole 40 mg/day + amoxicillin 1.5 g/day + metronidazole 1.2 g/day, 85%, 39%, and 2%, respectively;
6. omeprazole 40 mg/day + amoxicillin 2 g/day + clarithromycin 0.5 g/day, 86%, 22%, and 1%, respectively;
7. omeprazole 20 mg/day + clarithromycin 0.5 g/day + tinidazole 1 g/day, more than 90%, 7%, and less than 1 %, respectively.

**Measure of benefits used in the economic analysis**

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The eradication rate and side-effects were the measures of benefits used in the economic analysis. The eradication rate was defined as absence of H. pylori on testing at least one month after stopping therapy.

**Direct costs**
The resource quantities were not reported separately from the prices. The cost analysis was restricted to drug use. The cost estimation was based on actual data derived from the information regarding the implemented protocol. The price date used in the analysis was not clearly reported.

**Currency**
UK Pounds Sterling (£).

**Sensitivity analysis**
No sensitivity analysis was carried out.

**Estimated benefits used in the economic analysis**
The eradication rates and serious side-effects were estimated to be as follows:

(1) omeprazole 40 mg/day + amoxycillin 2 g/day, 60% and 2%, respectively;
(2) omeprazole 40 mg/day + clarithromycin 1 mg/day, 68% and 3%, respectively;
(3) bismuth 480 mg/day + tetracycline 2 g/day + metronidazole 1.2 g/day, 78% and 4%, respectively;
(4) bismuth 480 mg/day + tetracycline 2 g/day + metronidazole 1.2 g/day + omeprazole 40 mg/day, 86% and 4%, respectively;
(5) omeprazole 40 mg/day + amoxycillin 1.5 g/day + metronidazole 1.2 g/day, 85% and 2%, respectively;
(6) omeprazole 40 mg/day + amoxycillin 2 g/day + clarithromycin 0.5 g/day, 86% and 1%, respectively;
(7) omeprazole 20 mg/day + clarithromycin 0.5 g/day + tinidazole 1 g/day, more than 90% and less than 1%, respectively.

**Cost results**
The costs associated with the corresponding single treatments were reported to be as follows:

(1) omeprazole 40 mg/day + amoxycillin 2 g/day, 40;
(2) omeprazole 40 mg/day + clarithromycin 1 mg/day, 80;
(3) bismuth 480 mg/day + tetracycline 2 g/day + metronidazole 1.2 g/day, 15;
(4) bismuth 480 mg/day + tetracycline 2 g/day + metronidazole 1.2 g/day + omeprazole 40 mg/day, 30;
(5) omeprazole 40 mg/day + amoxycillin 1.5 g/day + metronidazole 1.2 g/day, 25;
(6) omeprazole 40 mg/day + amoxycillin 2 g/day + clarithromycin 0.5 g/day, 30;
(7) omeprazole 20 mg/day + clarithromycin 0.5 g/day + tinidazole 1 g/day, 30.
Synthesis of costs and benefits
Proton pump inhibitor triple therapy (in particular, low dose therapy with omeprazole plus clarithromycin plus tinidazole) was shown to be the dominant strategy.

Authors' conclusions
The preferred treatment for the eradication of H. pylori was proton pump inhibitor triple therapy. In particular low-dose therapy with omeprazole plus clarithromycin plus tinidazole achieved high eradication rate with a relatively simple regimen (5 tablets per day), few side-effects and a modest expense.

CRD COMMENTARY - Selection of comparators
The comparators chosen for the analysis were those found in the literature as having enough and adequate data to carry out an analysis of their relative merits in terms of effectiveness in treating H. pylori infection.

Validity of estimate of measure of benefit
The measure of health outcomes was based on an extensive systematic literature review and the synthesis of individual study results was based on average values weighted by study sample size. Exclusion and inclusion criteria of the review, however, could have been more strict, for example, by limiting included studies to RCTs only.

Validity of estimate of costs
The cost analysis was restricted to drug use only. The quantities related to drug consumption were clearly reported, however, no price date was reported for unit costs.

Other issues
The generalisability of the study results was not addressed directly in this study. Primary studies have come from a multinational context but cost analysis was limited to drug utilization only with prices existing in a Scottish setting.

Implications of the study
This study provides clinically highly significant results for the treatment of helicobacter pylori. However, more research on the validity of results and economic aspects is needed.

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None stated.

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