DYSPEPSIA MANAGEMENT

Helicobacter pylori test and treat strategy for young dyspeptic patients: new data

P Moayyedi

Decision analysis models have given different conclusions on the value of the Helicobacter pylori “test and treat” strategy for the management of dyspepsia. This uncertainty relates to the lack of primary data on this strategy. Four randomised controlled trials have compared the H pylori “test and treat” strategy with prompt endoscopy and have allowed a more accurate decision analysis model to be constructed. The model indicates that the H pylori test and treat strategy is more cost effective than prompt endoscopy, and should be the new “gold standard” against which other strategies are compared.

SUMMARY
A policy of screening dyspeptics who are 45 years of age or younger for Helicobacter pylori, and treating those who are positive for the bacterium, has been suggested. This strategy targets patients with a low risk of underlying malignancy and would identify and treat nearly all cases of peptic ulcer. Four randomised controlled trials have compared the H pylori “test and treat” strategy with prompt endoscopy. A formal meta-analysis of the data would not be appropriate given the variation in trial design and outcome measures. A qualitative and semiquantitative review of the data however can provide useful information to guide dyspepsia management. Three trials measured dyspepsia symptom resolution and found the H pylori test and treat strategy to be at least as effective as prompt endoscopy; quality of life was also similar in the two groups. Given that the two strategies have similar efficacy, the most appropriate health economic evaluation is cost minimisation. The decision analysis model indicates that the H pylori test and treat strategy is the most cost effective method for managing dyspepsia, costing US$134/patient/year compared with US$240/patient/year for prompt endoscopy. The model assumes that health service dyspepsia costs not related to endoscopy or H pylori screening are the same in both groups. The age group to which this strategy pertains has not been explored, as there are not enough data to reach definite conclusions. The safest approach would be to restrict the H pylori test and treat strategy to dyspepsia under 45 years of age.

INTRODUCTION
At the turn of the century, clinical opinion was the only method of diagnosing the cause of dyspepsia. This was as ineffective as the medications used to treat upper gastrointestinal symptoms, and patients consequently suffered. The advent of fibreoptic endoscopy revolutionised the investigation of dyspepsia, and this was followed by the development of acid suppressing drugs to treat peptic ulcer disease and gastro-oesophageal reflux disease. This improvement in diagnosis and treatment has been achieved at a price. Proton pump inhibitors are the most expensive item on the UK drug budget, costing £334 million a year. Endoscopies are also expensive, costing £246 in the UK, with over half a million performed each year.

The popularity of endoscopy stems from a clinician’s inherent desire to avoid uncertainty. Dyspepsia can be the presenting symptom of upper gastrointestinal neoplasia and it is natural to want to exclude this possibility by performing an endoscopy. Upper gastrointestinal malignancy is very rare in patients under the age of 45 years, and yet a third of all endoscopies are performed in this age group. This is largely due to the popularity of endoscopy stems from a clinician’s inherent desire to avoid uncertainty. The main reason for investigating young dyspepsics is to exclude peptic ulcer disease, as doctors and patients have been conditioned to believe that this is a serious condition which must be identified and treated. Most peptic ulcers are associated with H pylori, and the disease is cured by treatment of the infection. A policy of screening dyspeptics who are 45 years of age or younger for H pylori, and treating those patients found to be positive for the bacterium, has been suggested. This strategy targets a group that has a lower risk of underlying malignancy and would identify and treat nearly all cases of peptic ulcer. Patients with gastro-oesophageal reflux disease would not be identified but serious reflux causing oesophagitis is rare in the young (<5% of dyspepsics). H pylori positive ulcer negative cases may receive antibiotic therapy unnecessarily, but given the level of inappropriate antibiotic prescription in primary care (1.43 prescriptions/person/year) this will have little impact on community antimicrobial resistance rates. The main criticism of the H pylori “test and treat” strategy is that there have been no primary data on the efficacy of this approach in managing dyspepsia. There are now however four randomised controlled trials comparing the H pylori test and treat strategy with prompt endoscopy. It is difficult to design the perfect study to compare these strategies, and this article discusses the strengths and weaknesses of each trial and summarises the results.

NEW DATA
Patient selection
Ideally, patients should be recruited from primary care, as the trial results will be applied to this
population. Three trials recruited dyspeptics presenting to primary care whereas one study recruited *Helicobacter pylori* positive cases referred for endoscopy. Patients attending primary care may be different from dyspeptics seen in primary care, and the results of the latter study may not be generalisable to this setting. There is uncertainty about the age at which endoscopy is advisable to exclude underlying upper gastrointestinal malignancy. Heaney et al selected 45 years of age as the cut off whereas other studies recruited older patients. The variation in age range of individuals recruited makes it difficult to compare trials directly.

**Sample size and randomisation**

Trials need to recruit sufficient numbers of patients to detect clinically relevant differences in outcome between groups. Heaney et al recruited only 52 patients to each arm and could have missed a 30% difference in dyspepsia resolution between the two groups. Duggan et al randomised over 100 patients to each strategy and would have missed less than 20% difference in dyspepsia between the two groups. Lassen et al recruited 250 patients to each arm and had the power to detect less than 15% difference between the two groups. Randomisation is the most powerful method of ensuring that known and unknown confounding factors are equally distributed among the study groups. All trials used this method, although Jones et al randomised primary care centres rather than patients. Over 200 patients participated in this study but statistical power was limited by the small number of general practices randomised.

The sample size required also depends on the rarity of the outcome being measured. The two studies with power to detect clinically meaningful differences in dyspepsia rates between strategies did not have sufficient sample size to detect differences in the frequency of early cancer rates, as these events are rare. These studies recruited dyspeptics between 45 and 55 years of age, and the *Helicobacter pylori* test and treat strategy may be inappropriate in this age group. The incidence of gastric and oesophageal cancer increases after 45 years of age and, although these events are still uncommon, early detection by endoscopy may start to become cost effective. Further larger studies are needed to answer this question.

**H pylori assessment**

Two studies used the 13C urea breath test to evaluate *Helicobacter pylori* status. This is the “gold standard” non-invasive test for detection of *Helicobacter pylori*, with a sensitivity and specificity of more than 95%. The other studies used serology, which is cheaper and more convenient. Local validation is important however as the accuracy of commercial serology kits varies in different populations. Duggan et al validated the near patient serology test used in their trial and reported 69% sensitivity and 98% specificity. This low sensitivity may mean that some *Helicobacter pylori* infected dyspeptic patients would be falsely reassured and some peptic ulcers would be missed. This could lead to a lack of confidence in the *Helicobacter pylori* test and treat strategy among medical staff and patients due to inaccuracies in the test method.

**Patient assessment**

Patients should be assessed in primary care to ensure that their management accurately reflects what happens in general practice. Lassen et al recruited patients from primary care but their subsequent investigation and treatment was influenced by the investigators. In particular, patients randomised to the *Helicobacter pylori* test and treat strategy who did not respond to treatment, or who relapsed during the course of the trial, were required to have an endoscopy. This does not necessarily reflect management in primary care and may overestimate the number of endoscopies performed in the *Helicobacter pylori* test and treat group.

**Outcome measures**

Trials should have an adequate length of follow up and use validated and relevant outcome measures. Three studies followed participants for one year and one for six months. Relevant outcomes include patient satisfaction, healthcare costs, dyspepsia symptom resolution, and quality of life. Two studies measured all of these outcomes (table 1) and the other decision analysis arm. Measurement of outcome was a strong aspect of these studies compared with the quality of trials assessing treatments for non-ulcer dyspepsia.

**SUMMARISING THE NEW DATA**

The overall quality of the *Helicobacter pylori* test and treat trials was excellent but a formal meta-analysis of the data would not be appropriate given the variation in trial design and outcome.

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### Table 1 Summary of results of four trials comparing a *Helicobacter pylori* test and treat strategy with prompt endoscopy

<table>
<thead>
<tr>
<th>Reference</th>
<th>Primary care and treatment costs</th>
<th>Improvement in dyspepsia</th>
<th>Improvement in quality of life</th>
<th>Patient satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duggan and colleagues⁷</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Endoscopy better</td>
</tr>
<tr>
<td>Jones and colleagues⁴</td>
<td>Same</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Heaney and colleagues⁹</td>
<td>N/A</td>
<td>Test and treat strategy better</td>
<td>Same</td>
<td>N/A</td>
</tr>
<tr>
<td>Lassen and colleagues⁵⁶</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>Endoscopy better*</td>
</tr>
</tbody>
</table>

N/A, not applicable. *In a subgroup of *Helicobacter pylori* negative patients.
measures. A qualitative and semiquantitative review of the data can however provide useful information to guide dyspepsia management.

The three trials that measured dyspepsia symptom resolution found that a H pylori test and treat strategy was at least as effective as prompt endoscopy, and quality of life was also similar between the two groups (table 1). Given that the two strategies have similar efficacy, the most appropriate health economic evaluation is cost minimisation analysis (that is, the cheapest policy will be the most cost effective). Data from the four trials can be used to determine the cost of the two strategies. The cost to society is the most relevant information to use but as this is only available from one trial at present, costs from a health service perspective were incorporated into a decision analysis model (fig 1). The most important factor in this model is the proportion of patients in the H pylori test and treat group having endoscopy during the follow up period. Results from the four trials indicate that the proportion having endoscopy could be as low as 10% or as high as 40%, with 30% being the best estimate (fig 2). The model also requires other estimates outlined in table 2.

Patient satisfaction has not been incorporated into the analysis as this is a difficult concept to model. Patients having endoscopy were more satisfied with the investigation than patients randomised to the H pylori test and treat strategy (table 1). Endoscopy is more technical and expensive, and patients may therefore perceive endoscopy as being “better” even if there is no improvement in quality of life or dyspepsia compared with simpler investigation strategies. This is analogous to consumers preferring an expensively packaged product to an identical but less well marketed item. Health services should acknowledge these desires but, as it is difficult to attach a monetary value to these preferences, they have not been incorporated into this model.

The decision analysis model indicates that the H pylori test and treat strategy is the cheapest strategy, costing US$134/patient/year compared with US$240/patient/year for the prompt endoscopy strategy, using base case values. The H pylori test and treat strategy is therefore the most cost effective method for managing dyspepsia. This conclusion remains robust if one or two variables are altered across the ranges stated in table 2 (that is, one and two way sensitivity analyses). The prompt endoscopy strategy only becomes cost effective in the unlikely scenario of endoscopy costing US$160, the non-invasive test costing US$80, and a H pylori prevalence of less than 20%. The model assumes that health service dyspepsia costs not related to endoscopy or H pylori screening are the same in both groups. This assumption is supported by the data (table 1) but a small increase in primary care visits and antiseudary drug prescriptions for patients in the H pylori test and treat group may not have been detected by the trials. The model indicates that these costs would have to be more than 3.5 times more in the H pylori test and treat group for prompt endoscopy to be more cost effective over one year (fig 3). The trials had sufficient power to detect this magnitude of difference, reinforcing the conclusion that the H pylori test and treat strategy is the most cost effective strategy.

The age group to which this strategy pertains has not been explored as there are not enough data to reach definite conclusions. The safest approach would be to restrict the H pylori test and treat strategy to dyspeptics under 45 years of age. This decision analysis model estimates costs over one year, as this is the only information available from the trials. Evaluating expenditure over a longer time frame may be more relevant, and future studies need to address this issue. Empirical H pylori therapy for all dyspepsics or H pylori testing and endoscoping those infected may be alternative management strategies that are even more cost effective. Trials in these areas are currently being conducted and the results are awaited with interest.

### CONCLUSION

Decision analysis models have given different conclusions on the value of the H pylori test and treat strategy for the management of dyspepsia.29 This uncertainty relates to the

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**Table 2** Probabilities and costs incorporated into the decision analysis model

<table>
<thead>
<tr>
<th>Variable</th>
<th>Baseline value</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability of endoscopy after H pylori test and treat</td>
<td>0.3</td>
<td>0.1-0.4</td>
</tr>
<tr>
<td>Prevalence of H pylori</td>
<td>0.33</td>
<td>0.05-0.9</td>
</tr>
<tr>
<td>Cost of endoscopy</td>
<td>US$240</td>
<td>US$160-800</td>
</tr>
<tr>
<td>Cost of H pylori screening</td>
<td>US$40</td>
<td>US$24-80</td>
</tr>
<tr>
<td>Cost of H pylori treatment</td>
<td>US$34</td>
<td>US$34-68</td>
</tr>
<tr>
<td>Cost of primary care visits and treatment</td>
<td>US$134</td>
<td></td>
</tr>
</tbody>
</table>
lack of primary data on this strategy. We now have four trials evaluating the H pylori test and treat strategy which allow a more accurate decision analysis model to be constructed. The model indicates that the H pylori test and treat strategy is more cost effective than prompt endoscopy, and should be the new “gold standard” against which other strategies are compared.

ACKNOWLEDGEMENT
Dr Paul Moayyedi is currently being funded by a UK Medical Research Council Training Fellowship in Health Services Research.

Conflict of interest: This symposium was sponsored by AstraZeneca, makers of omeprazole. The author of this paper has received sponsorship for travel and an honorarium from AstraZeneca.

REFERENCES