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.

CRD summary
This study evaluated the costs and effects of a routine second endoscopy, after initial therapeutic endoscopy, for patients with a peptic ulcer and a high risk of bleeding. The authors concluded that routine second endoscopy was not supported, but for patients at a high risk, it could save costs. The study was limited as it did not include current practice, and had a narrow costing perspective. The limitations were acknowledged and the conclusions seem reasonable.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
This study evaluated the costs and effects of a routine second endoscopy, after initial therapeutic endoscopy, for patients with a peptic ulcer and a high risk of bleeding.

Interventions
The interventions were routine second-look endoscopy, and no second endoscopy. The second endoscopy was usually performed within 16 to 24 hours of the first endoscopy, and could be followed by surgery.

Location/setting
USA/secondary care.

Methods
Analytical approach:
A decision tree was developed for the pathway of patients after a first endoscopy to treat bleeding in peptic ulcer disease. Patients who were assigned to no second endoscopy could have a second endoscopy if bleeding recurred. Second endoscopies could result in bleeding, complications, surgery, or death. The authors stated that their perspective was that of the health care system.

Effectiveness data:
The primary measures of effectiveness were the probabilities of bleeding, which were from the literature; the need for surgery; and mortality. Mortality (5%) was based on an assumption, as were the risks of death after surgery. Mortality after surgery was a surgical complication. Patients who survived surgery had other complications 10% of the time, and did not 85% of the time, based on expert opinion.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
Clinical effectiveness measures were the measures of benefit.

Cost data:
The costs were from the Centers for Medicare and Medicaid Services (CMS), a published study, and expert opinion. The CMS costs included the diagnostic and therapeutic endoscopy procedures, surgery with perforation or bleeding, and surgical complications. Hospital costs with or without bleeding were from a published study. The cost of death was
based on expert opinion. Only the direct costs were included. All costs were reported in US $.

Analysis of uncertainty:
One-way sensitivity analyses were proposed. Additional analyses were conducted by varying two parameters and identifying the thresholds at which a second endoscopy resulted in no costs or saved costs.

Results
With second endoscopy, the absolute risk of bleeding was 10%, without it the risk was 16%; an absolute risk difference of 6%. All other outcomes favoured no second endoscopy: less surgery, fewer complications, lower mortality, and lower costs.

The 6% absolute risk difference translated to a number-needed-to-treat of 16 patients to prevent one bleed, at a cost of $12,950 per bleed prevented.

The threshold analysis demonstrated that the absolute risk of bleeding, after the initial endoscopy, had to be 31% or more for a second endoscopy to have no cost or be cost-saving. For other outcomes (surgery, complications, mortality), the threshold was 29%.

The absolute risk of bleeding, after the second endoscopy, had to be 16% or less for a second endoscopy to have no cost or cost savings, and 4% or less for it to reduce the need for surgery, surgical complications or mortality.

Authors' conclusions
The authors concluded that routine second endoscopy was not supported by their results, but for patients with a 31% or higher risk, it had no extra cost or could save costs.

CRD commentary
Interventions:
The interventions were reasonably described. The authors indicated that standard practice had changed since the studies that informed the model were conducted, so the results may not be generalisable to current practice. Most of the sources included comparisons to the proton pump inhibitor omeprazole, it is unclear why this intervention was not considered.

Effectiveness/benefits:
There was no description of how the studies were identified or selected; it is unclear whether the best available evidence was used. The derivation of the clinical parameters, and the design of the studies, were not reported, so it is hard to assess the clinical evidence. The authors indicated that the trials were conducted before the use of intravenous proton pump inhibitors, which could have exaggerated the absolute risk difference between second endoscopy and no second endoscopy. They acknowledged that if the absolute risk of bleeding was lower after the first endoscopy, which is likely given that proton pump inhibitors reduce bleeding, then there could be little or no difference in bleeding; the only outcome that favoured second endoscopy. Also, bleeding could have other outcomes and comorbidities. The analysis did not consider outcomes such as aspiration pneumonia, stroke, myocardial infarction, and renal failure; nor any exacerbation of current comorbidities.

Costs:
The cost analysis had a narrow perspective, as it only included the direct hospital costs for procedures and hospitalisation. This did not include any costs for comorbid events and exacerbations, nor any measure of hospital stay. These limitations were acknowledged by the authors, but it was not clear how they identified and selected their costs. CMS costs are based on reimbursement, which may not be the same as the cost to the provider. The cost year was not reported, nor were any methods used to normalise the prices from different sources.

Analysis and results:
The analysis was clearly reported. The limitations were acknowledged, and appropriate conclusions were reached. Appropriate comparisons were made with other work, including a study of proton pump inhibitors and second-look endoscopy for a high-risk patients (see Other Publications of Related Interest). Given the age of many of the sources, the results may not be relevant to current practice, as acknowledged by the authors.
Concluding remarks:
The study was limited as it did not include current practice, and had a narrow costing perspective. The limitations were acknowledged and the conclusions seem reasonable.

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