A prospective evaluation of computerized tomographic (CT) scanning as a screening modality for esophageal varices
Perri RE, Chiorean MV, Fidler JL, Fletcher JG, Talwalkar JA, Stadheim L, Shah ND, Kamath PS

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 examined the cost-effectiveness of and patients’ preferences for a strategy employing abdominal computed tomography (CT) as an initial screening test to identify large oesophageal varices, in patients with compensated cirrhosis, in whom the presence or absence of varices was not known. The authors concluded that abdominal CT scan could be cost-effective and the choice preferred by patients. In summary, the methods and results were not fully reported and the authors’ conclusions should be interpreted with caution.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
This study examined the cost-effectiveness and patients’ preferences for a strategy using abdominal computed tomography (CT) as an initial screening test to identify large oesophageal varices, in patients with compensated cirrhosis, in whom the presence or absence of oesophageal varices was not known.

Interventions
CT imaging scan was compared against upper gastrointestinal endoscopy, CT scan followed by endoscopy for those patients with small varices on the CT, and no intervention.

Location/setting
USA/in-patient.

Methods
Analytical approach:
This study was undertaken alongside a prospective clinical study. A decision analytic model (decision tree) was constructed, with a time horizon of two years. The authors stated that the study was conducted from a third-party payer perspective.

Effectiveness data:
The single, prospective, clinical study provided estimates for the economic evaluation. The primary clinical outcomes were the sensitivity, specificity, and positive and negative predictive values of the CT scan, with endoscopy as the reference standard. Patient preferences for the investigations were also recorded on questionnaires. The probabilities of bleeding and other complications from endoscopy were abstracted from other recently published studies. Two gastrointestinal radiologists, each with over 10 years of experience, independently examined the results of the CT scans. Inter-observer correlation between five endoscopists regarding variceal size was facilitated using photographs of varices. Each endoscopist was blind to the results of the others, as were the two radiologists. The sample contained 102 patients and was powered to detect a 15% difference in detection rate for oesophageal varices between the strategies.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
The measure of benefit was variceal bleeds prevented.
Cost data:
The resource types were the CT scan investigation (procedure cost, contrast, and consultation fee), endoscopy (procedure cost, facility fee, and consultation fee), in-patient admissions for variceal bleeding, endoscopic complications, and beta-blocker therapy. The unit costs were obtained from US Medicare sources and the Red Book for beta-blocker drug costs. All costs were reported in US dollars ($).

Analysis of uncertainty:
One-way sensitivity analyses were performed, where the sensitivity of detecting varices was varied from 100% to 90% and the prevalence of large varices was changed from 20% to 30%.

Results
The total two-year cost was $1,898 for no intervention, $1,916 for CT scan, $2,159 for endoscopy, and $2,433 for CT scan with endoscopy for small varices. The percentage of patients in whom a variceal bleed was prevented over two years was 0.826 for no intervention, 0.903 for CT scan, 0.910 for endoscopy, and 0.901 for CT scan with endoscopy for small varices.

The incremental cost per bleed prevented was $232 for CT scan and $35,960 for endoscopy. Compared with the CT scan and endoscopy alone options, the CT scan with endoscopy strategy was less effective and more expensive and was therefore dominated.

When the sensitivity was decreased to 90%, CT scan was more effective and less costly than endoscopy with or without CT scan. The cost-effectiveness ratio for the CT scan strategy increased to over $50,000 per bleed prevented when the prevalence of large varices decreased to 5%.

Authors' conclusions
The authors concluded that abdominal CT scan could be cost-effective and the choice preferred by patients.

CRD commentary
Interventions:
The interventions were clearly reported and reflected the currently accepted investigations in clinical practice.

Effectiveness/benefits:
The decision model was illustrated in a supplementary file. The effectiveness data were based on a prospective diagnostic trial with sufficient power to detect meaningful differences in diagnostic rates. The performance of the endoscopies was questionable as low agreement was found among endoscopists as to what constituted large varices. The methods and justification for choosing additional published studies for the estimates on probabilities of bleeding and other complications from endoscopy were not discussed and neither was the quality of these sources.

Costs:
The costs were presented as macro-categories and a breakdown of unit prices and resources was not given, which limits the generalisability of the analysis. Other cost details, such as the sources of the cost data, price year, and discount rate, were not provided, which will hinder the replication of this study for other settings and time periods. The costs were reported in an appendix and the reader is referred to this appendix to fully access their relevance.

Analysis and results:
The costs and effects were adequately combined into incremental cost-effectiveness ratios. The one-way sensitivity analysis appears to have accounted for some uncertainty, but a multi-way or probabilistic sensitivity analysis would have been more appropriate and the cost variables were not included in the sensitivity analyses. This makes it difficult to assess whether the results were robust to alternative assumptions. Discounting was not carried out, but it was relevant for the two-year time horizon. The authors provided a detailed discussion of the implications and limitations of their study.

Concluding remarks:
The methods and results of the cost-effectiveness study were not fully reported, which makes the authors’ conclusions
difficult to assess.

**Funding**
Supported by a fellowship from the American Association for the Study of Liver Diseases.

**Bibliographic details**

**PubMedID**
18393388

**DOI**
10.1002/hep.22219

**Original Paper URL**
http://onlinelibrary.wiley.com/cgi-bin/fulltext/117891858/PDFSTART

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Adult; Aged; Contrast Media; Endoscopy; Esophageal and Gastric Varices /classification /etiology /pathology /radiography; Female; Humans; Liver Cirrhosis /complications; Liver Diseases /complications /etiology; Male; Mass Screening /methods; Middle Aged; Patient Selection; Reproducibility of Results; Tomography, X-Ray Computed /methods

**AccessionNumber**
22008101088

**Date bibliographic record published**
03/02/2009

**Date abstract record published**
11/11/2009