Impact of computer-aided detection on the cost-effectiveness of CT colonography


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
The aim was to examine the cost-effectiveness of adding computer-aided detection to colonography using computed tomography in screening for colorectal cancer for men and women aged 50 to 100 years. The authors concluded that the addition of computer-aided detection improved the colorectal cancer prevention rate and was cost-effective with inexperienced and experienced readers. The lack of reporting makes it difficult to be confident in the reliability of the results. Whilst the impact of this might be small, caution is suggested.

Type of economic evaluation
Cost-effectiveness analysis, cost-utility analysis

Study objective
The aim was to examine the cost-effectiveness of computer-aided detection in addition to colonography, using computed tomography (CT), in screening for colorectal cancer in men and women aged 50 to 100 years.

Interventions
Screening by CT colonography, with or without computer-aided detection and with experienced or inexperienced readers, was compared with optical colonoscopy, flexible sigmoidoscopy, and no screening.

Location/setting
USA/the setting was not reported.

Methods
Analytical approach:
A Markov model was developed to compare the costs and outcomes associated with each screening strategy. A lifetime horizon was used and the authors reported that a societal perspective was adopted.

Effectiveness data:
The clinical estimates were derived from published studies. The main clinical parameters were the sensitivity and specificity of the various screening strategies.

Monetary benefit and utility valuations:
The utility weights were derived from a published study.

Measure of benefit:
The main measures of benefit were life-years (LYs) and quality-adjusted life-years (QALYs) saved, discounted at an annual rate of 3%.

Cost data:
Screening, surveillance, and colorectal cancer treatment costs were included, as well as the loss of income arising from attendance at screening. The cost estimates were based on Medical reimbursement data and data from published studies. The cost of the addition of computer-aided detection to a CT colonography was estimated and was varied in the sensitivity analysis. The price year was 2007 and all costs were reported in US dollars ($). They were discounted at an annual rate of 3%.

Analysis of uncertainty:
The analysis of uncertainty included a Monte Carlo simulation, in which all the parameters were varied simultaneously and individually.

**Results**

The baseline strategy of no screening cost $204,319,642, flexible sigmoidoscopy cost $273,875,213, CT colonography cost $317,473,877 with an experienced reader and $327,385,334 with an inexperienced reader, CT colonography plus computer-aided detection cost $332,519,965 with an experienced reader and $338,269,265 with an inexperienced reader, and optical colonoscopy cost $378,964,158.

The life-years saved were 8194 with flexible sigmoidoscopy; 10,331 with CT colonography with an experienced reader and 8247 with an inexperienced reader; 10,576 with CT colonography plus computer-aided detection with an experienced reader and 9,504 with an inexperienced reader; and 10,669 with optical colonoscopy.

An incremental analysis was conducted and the strategies were ranked by their cost compared with the next best alternative. The incremental cost effectiveness ratio (ICER) for flexible sigmoidoscopy compared with no screening was $8,489 per LY saved. For CT colonography with experienced readers compared with flexible sigmoidoscopy it was $20,399. For CT colonography plus computer-aided detection with experienced readers compared with CT colonography with experienced readers it was $61,354. For optical colonoscopy compared with CT colonography plus computer-aided detection with an experienced reader it was $498,668.

When the analysis was limited to the addition of computer-aided detection, the ICER for CT colonography plus computer-aided detection compared with CT colonography alone, with inexperienced readers, was $8,661 and with experienced readers it was $61,354 per LY saved.

In the Monte Carlo analysis, the ICER for CT colonography with computer-aided detection over CT colonography alone ranged from zero to $35,927 with inexperienced readers and from zero to $178,337 with experienced readers. An increase from $50 to $92, in the cost of adding computer-aided detection to a CT colonography, resulted in an ICER of more than $100,000 for CT colonography plus computer-aided detection over CT colonography alone, with experienced readers.

**Authors’ conclusions**

The authors concluded that the addition of computer-aided detection to CT colonography screening improved the colorectal cancer prevention rate and was cost-effective with inexperienced and with experienced readers.

**CRD commentary**

**Interventions:**

The interventions were clearly reported and appear to have been relevant strategies in the authors’ setting.

**Effectiveness/benefits:**

The effectiveness data were derived from published studies, but the methods of a literature review were not reported, which makes it impossible to tell if the best available evidence was used. The effectiveness estimates were reported in full. The outcome measures used, LYS saved and QALYS, were appropriate, but little detail was provided about the derivation of the quality weights.

**Costs:**

The costs appeared to reflect the perspective stated. Indirect costs associated with screening were included in the analysis, but few details of their derivation were provided. Total, rather than unit costs, were reported, which might make it difficult to replicate the analysis in other settings. Sensitivity analysis was performed on the cost estimates.

**Analysis and results:**

The authors performed an appropriate incremental analysis and the full results were provided. The issue of uncertainty was satisfactorily addressed through the sensitivity analysis. The authors reported some limitations to their analysis, including the reliability of the efficacy data for computer-aided detection.
Concluding remarks:
The lack of reporting on the clinical parameters makes it difficult to be confident in the reliability of the results. Whilst the impact of this issue might be small, caution is suggested.

Funding
Not stated.

Bibliographic details

PubMedID
19188317

DOI
10.1148/radiol.2502080685

Original Paper URL
http://radiology.rsna.org/content/250/2/488.abstract

Indexing Status
Subject indexing assigned by NLM

MeSH
Aged; Aged, 80 and over; Colonography, Computed Tomographic /economics /methods; Colonoscopy; Colorectal Neoplasms /economics /epidemiology /radiography; Cost-Benefit Analysis; Diagnosis, Computer-Assisted /economics /methods; Female; Humans; Male; Markov Chains; Mass Screening; Middle Aged; Sensitivity and Specificity; Sigmoidoscopy; United States /epidemiology

AccessionNumber
22009101174

Date bibliographic record published
20/05/2009

Date abstract record published
11/08/2010