Screening based on risk for colorectal cancer is the most cost-effective approach

Dan YY, Chuah BY, Koh DC, Yeoh KG

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 assess the cost-effectiveness of different methods of screening for colorectal cancer in adults aged 50 to 75 years in Singapore. The authors concluded that a tailored screening programme, based on risk, was most cost-effective. The results were generally well reported, but the methods were not described in detail, making it hard to assess the authors’ conclusions.

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

Study objective
The objective was to assess the cost-effectiveness of screening for colorectal cancer, using traditional recommended screening methods or selective screening based on the risk of colorectal cancer, in adults aged 50 to 75 years in Singapore.

Interventions
Eight screening strategies were compared with no screening: sigmoidoscopy at age 60 years, colonoscopy at age 60 years, immunological faecal occult blood test (iFOBT) annually, double contrast barium enema every five years, sigmoidoscopy every five years with annual iFOBT, stool DNA every five years, computed tomography (CT) colonography every five years, and colonoscopy every 10 years.

Patients with a positive test result were followed up with counselling, confirmatory colonoscopy, and usual treatment.

Location/setting
Singapore/primary and secondary care.

Methods
Analytical approach:
A state transition model was used to synthesise the data from published literature, databases, and population studies. The time horizon was lifetime and the authors stated that the perspective was societal. The main analysis was for people with an average risk of colorectal cancer.

Effectiveness data:
The clinical effectiveness estimates came from a search in PubMed and from a national cancer registry. The most appropriate estimates were selected from the evidence found. The main clinical estimates were the colorectal cancer incidence rate, sensitivity and specificity of tests, reduction of colorectal cancer incidence attributable to screening, and compliance.

Monetary benefit and utility valuations:
The source for the utility values was a published study.

Measure of benefit:
Quality-adjusted life-years (QALYs) were the summary benefit measure and they were discounted at a rate of 3% per year.

Cost data:
The cost categories were the screening procedures, set-up and training of screening staff, treatment of cancer, programme infrastructure, public education, audit, and the costs for those attending for screening. The sources for the resource use and prices included hospital billing records from four government hospitals in Singapore and published literature. The price year was 2009 and all costs were reported in US $.

Future costs were discounted at a rate of 3% per year.

Analysis of uncertainty:
One-way and multi-way sensitivity analyses were conducted, using ranges for the estimates from published literature. The results were presented in graphs, using cost-effectiveness acceptability curves.

Results
The estimated average QALYs per person for each screening strategy ranged from 16.392 for single sigmoidoscopy to 16.406 for five-yearly CT colonography or 10-yearly colonoscopy. No screening was associated with an average 16.389 QALYs per person.

The average cost per person for each screening strategy ranged from $290 for single sigmoidoscopy to $1,086 for five-yearly CT colonography. No screening was associated with an average cost of $219 per person.

Stool DNA was dominated by sigmoidoscopy plus iFOBT, as stool DNA was more expensive and less effective. CT colonography was dominated by colonoscopy. The lowest incremental cost-effectiveness ratio, compared with no screening, was $24,825 per QALY gained for a mixed strategy of annual iFOBT from 50 to 60 years, then colonoscopy every 10 years from 60 to 72 years. This reduced the cost per QALY gained to $21,100.

Sensitivity analyses showed that the risk of colorectal cancer, adherence and cost of colonoscopy had the biggest impact on the cost-effectiveness results.

Authors' conclusions
The authors concluded that a tailored screening programme, based on risk, was most cost-effective.

CRD commentary
Interventions:
The reporting of the interventions was generally good and it appears that the full range of available options was included. Where an option was excluded, this was fully justified. It is likely these interventions will be relevant for other settings.

Effectiveness/benefits:
The effectiveness data were adequately reported, except the utility values. The authors described the methods used to identify relevant studies, but did not state how they selected the source studies. It seems that all studies on colorectal cancer screening were identified and it is likely that the best available sources were used. The instrument used and whose preferences were elicited for the utility estimates, used to calculate the QALYs, were not described and the validity of the QALYs cannot be assessed.

Costs:
The reporting of costs was generally poor, particularly for indirect costs, and set-up and training, but the appendices provided some detail in tables, for the other costs. The measurement of the resource data and the methods used to analyse the cost data were not reported. Cost adjustments may have been necessary to convert from Singapore hospital costs to US $, but they were not reported. The costs were relevant to the stated perspective, but they were not comprehensive, for instance productivity losses due to early death from colorectal cancer were not listed.

Analysis and results:
An incremental analysis was appropriate to assess the relative cost-effectiveness of the numerous screening strategies. The authors considered the impact of uncertainty on the results, but a probabilistic sensitivity analysis could have assessed the overall impact of parameter uncertainty on the results. The reporting of the results was generally good and the authors discussed some key limitations to their study.
Concluding remarks:
The results were generally well reported, but the methods were not described in detail, making it hard to assess the authors' conclusions.

Funding
Not stated.

Bibliographic details
Dan YY, Chuah BY, Koh DC, Yeoh KG. Screening based on risk for colorectal cancer is the most cost-effective approach. Clinical Gastroenterology and Hepatology 2012; 10(3): 266-271

PubMedID
22100624

DOI
10.1016/j.cgh.2011.11.011

Original Paper URL
http://www.cghjournal.org/article/S1542-3565(11)01223-7/abstract

Indexing Status
Subject indexing assigned by NLM

MeSH
Adult; Aged; Blood Chemical Analysis; Colonoscopy /economics /methods; Colorectal Neoplasms /diagnosis; Cost-Benefit Analysis; Early Detection of Cancer /economics /methods; Feces /chemistry; Female; Humans; Male; Middle Aged; Models, Statistical; Singapore

AccessionNumber
22012009364

Date bibliographic record published
30/04/2012

Date abstract record published
11/12/2012