Colorectal cancer screening under the age of 50 is less cost-effective

Nakama H, Zhang B, Fukazawa K

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.

Health technology
The use of colonoscopy for screening for colorectal cancer (CRC) among three cohorts of different age. The cohorts were younger (40 to 49 years), middle-age (50 to 59 years) and older (60 years or more).

Type of intervention
Screening.

Economic study type
Cost-effectiveness analysis.

Study population
The population comprised asymptomatic individuals aged 40 years or older.

Setting
The setting was a hospital. The economic study was performed in Japan.

Dates to which data relate
The effectiveness data were collected between 1990 and 1999. The dates to which the costs related were not reported. The price year was not given.

Source of effectiveness data
The effectiveness data were derived from a single study.

Link between effectiveness and cost data
It was not stated whether the costing was undertaken on the same patient population as that used in the effectiveness study, nor whether the costs were collected prospectively or retrospectively.

Study sample
The sample size was not reported for the planning phase of the study to assure a certain power. In total, 9,938 asymptomatic people aged at least 40 years participated in a medical check-up, receiving a colonoscopic examination. The participants were employees of several companies. All these individuals were accounted for in the effectiveness analysis. Three groups were considered. There were 3,229 individuals in the younger group (age 40 to 49 years), 3,858 in the middle group (age 50 to 59 years) and 2,851 in the older group (age at least 60 years). The authors provided no evidence that the study sample was representative of the study population, although this is likely to have been the case.
Study design
This was an uncontrolled cohort study performed at a single centre. The duration of the follow-up was not reported, although it may have been from the date of the medical check until the patient received the results of the colonoscopy. No loss to follow-up was reported.

Analysis of effectiveness
The basis for the clinical study was not reported, although it was, in fact, intention to treat. The primary health outcomes assessed in the analysis were the number of detected CRC cases and the detection rate for each of the age-cohort groups. The groups were not shown to be comparable at analysis, although this was probably irrelevant due to the nature of the analysis (screening across cohorts of different age).

Effectiveness results
Six cases of CRC were detected in the younger group, 40 in the middle group and 37 in the older group. Therefore, the total number of detected CRC cases was 83.

The detection rates were 0.19 for the younger group, 1.04 for the middle group, 1.30 for the older group and 0.84 for the whole sample population.

The detection rates were significantly lower for the younger group when compared with those of the middle group, \( p<0.05 \). The middle group also presented a significantly smaller detection rate in comparison with the older group, \( p<0.05 \).

Clinical conclusions
The detection rates were shown to be significantly higher among older people than among younger people.

Measure of benefits used in the economic analysis
The measure of benefit used was the number of cases of CRC detected.

Direct costs
The resource quantities and the costs were not reported separately. The direct costs included in the analysis were those of the examination. The authors did not report the source of the direct cost data. Discounting does not appear to have been performed, but was irrelevant because the costs were incurred over less than 2 years. The costs reported were the average costs. The price year was not given.

Statistical analysis of costs
No statistical analysis of the costs was reported.

Indirect Costs
No indirect costs were reported.

Currency
US dollars ($) and Japanese yen (Y).

Sensitivity analysis
No sensitivity analysis was reported.
Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

Cost results
The cost per diagnostic examination was $136.36 (Y 15,000). Therefore, the overall examination costs per age-cohort were $440,318.18 for the younger group, $526,090 for the middle group and $388,772.72 for the older group.

Synthesis of costs and benefits
A cost-effectiveness ratio (CER) can be obtained from the study, considering that the alternative of doing-nothing would not imply any cost and, at the same time, would not detect any CRC. Therefore, the average cost per case of CRC detected can be considered as the CER. The CER results were $73,386 per CRC case for the younger group, $13,152 per CRC case for the middle group, and $10,507 per CRC case for the older group.

Authors' conclusions
Colorectal cancer (CRC) screening under the age of 50 is less predictive for CRC, and is less cost-effective than for people aged 50 years or older. The age of 50 is recommended as an optimal lower limit of age, allowing CRC screening to be cost-effective.

CRD COMMENTARY - Selection of comparators
The comparator was explicitly stated as the detection rate and CER among the three different age cohorts. One could also consider the comparator to be 'do-nothing', which allows the evaluation of the screening intervention. However, it would have been relevant to have compared different methods of screening for CRC (such as faecal occult blood test or flexible sigmoidoscopy) as well as different age-cohorts, to analyse which method was the most cost-effective for CRC screening. You should decide if CRC screening with colonoscopy is a widely used technology in your own setting.

Validity of estimate of measure of effectiveness
The analysis was based on a cohort study (using 3 different age groups), which was appropriate for the study question. Statistical analyses were not performed to take account of potential bias and confounding factors. The authors provided no evidence that the study sample was representative of the study population. They did, however, report a limitation of the effectiveness analysis in that the study did not include a sample of all the asymptomatic patients in the community, but only working people, due to operational difficulties. Therefore, there may have been selection bias because of the characteristics of the study sample (employees of several specific companies). However, the sample size was fairly large, which may have enhanced how well the sample represented the study population. Another limitation was that the risks of colonoscopy, such as perforation or bleeding, were not considered in the effectiveness analysis.

Validity of estimate of measure of benefit
The estimation of benefits was obtained directly from the effectiveness analysis. This choice of estimate was implicitly justified because the authors wished to analyse the cost-effectiveness of performing screening according to the number of cases detected, which was the summary measure of health benefit used in the study. Nevertheless, alternative summary measures of health benefits could have been considered at analysis, such as the number of life-years or the quality-adjusted life-years gained with the screening intervention.

Validity of estimate of costs
The perspective that appears to have been adopted (the intervention perspective) was limited. It did not consider, for example, the future health benefits from prompt detection of CRC. The resource quantities and the costs were not reported separately, and the source of the cost data was not given. In addition, statistical analyses of the costs were not performed and the price year was not stated. These factors introduce uncertainty into the reliability of the conclusions and hinder reflation exercises and generalisability to other settings. The authors reported an additional limitation in that
there may be indirect costs associated with CRC screening that were not considered at analysis.

**Other issues**
The authors did not make any comparison of their findings with those from other studies. They reported that the cost-effectiveness of CRC screening depends on the prevalence of CRC and the costs of the examination, which vary across countries. Therefore, the results of this study should not be generalised to other countries, but instead, provide evidence relating to the relative cost-effectiveness of CRC screening with the intervention among different age groups.

**Implications of the study**
The authors stated that the study provides information about the detection rates of CRC and the optimal lower limit of age for CRC screening. The authors recommend further efforts to evaluate the indirect costs associated with CRC screening that were not considered in this study.

**Source of funding**
Funded in part by Grants-in-Aid for Scientific Research (No. 09670384) from the Ministry of Education and Science and Culture of Japan and Cancer Research (No. 8-2) from the Ministry of Health and Welfare of Japan.

**Bibliographic details**

**Other publications of related interest**


**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Adult; Age Factors; Aged; Cohort Studies; Colonic Neoplasms /diagnosis; Colorectal Neoplasms /diagnosis; Cost-Benefit Analysis; Humans; Mass Screening /economics; Middle Aged; Predictive Value of Tests; Rectal Neoplasms /diagnosis

**AccessionNumber**
22002009123

**Date bibliographic record published**
31/05/2003
Date abstract record published
31/05/2003