Colorectal cancer screening comparing no screening, immunochemical and guaiac fecal occult blood tests: a cost-effectiveness analysis
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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 screening for colorectal cancer using either immunochemical faecal occult blood testing (FOBT) or guaiac FOBT, compared with no screening, for individuals aged 50 to 75 years, focusing on real-world compliance rates, from the perspective of the third-party payer. The authors concluded that immunochemical FOBT was more effective and less expensive than both guaiac FOBT and no screening. The analysis was satisfactorily carried out and the authors' conclusions appear to be robust.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
This study examined the cost-effectiveness of screening for colorectal cancer, using either immunochemical faecal occult blood testing (FOBT) or guaiac FOBT, compared with no screening, for average-risk individuals aged 50 to 75 years, focusing on real-world compliance rates.

Interventions
The two interventions were one round of either immunochemical FOBT or guaiac FOBT screening. The background comparator was no screening. Positive FOBT results were followed by colonoscopy.

Location/setting
Netherlands/primary care.

Methods
Analytical approach:
The analysis was based on a Markov model, with a 10-year time horizon. The authors stated that the perspective of the third-party payer was adopted.

Effectiveness data:
The clinical data were primarily from a published randomised controlled trial (RCT); some data were from the Dutch National Cancer Registry and published literature. The RCT was carried out in the Netherlands on 20,623 people who were randomly allocated to receive either guaiac FOBT or immunochemical FOBT. The key clinical inputs were the accuracy of screening and the compliance, and these data were from the clinical trial. Epidemiological data, such as cancer incidence and mortality due to colorectal cancer, were from the Dutch National Cancer Registry.

Monetary benefit and utility valuations:
Not considered.

Measure of benefit:
Life-years were the summary benefit measure and they were discounted at an annual rate of 3%

Cost data:
The economic analysis included the costs of the screening tests (the sample taking and laboratory analyses), test invitation, colonoscopy including polypectomy and pathology report, colonoscopy-related complications (bleeding or
perforation), and treatment of colorectal cancer (surgery, chemotherapy, and radiotherapy). The costs were from retail prices for the screening tests and from the Dutch Health Care Authority database for other costs. All costs were in Euros (EUR) and were discounted at an annual rate of 3%.

Analysis of uncertainty:
A probabilistic analysis was carried out using first- and second-order Monte Carlo simulations. One-way sensitivity analyses were performed on all the model inputs, especially the colorectal cancer incidence and the cost drivers, such as the cost of colonoscopy and the discount rates. Published or assumed ranges of values and probability distributions were used.

Results
The projected costs per person were EUR 301 with immunochemical FOBT, EUR 327 with guaiac FOBT, and EUR 373 with no screening. The life-years were 9.0496 with immunochemical FOBT, 9.0472 with guaiac FOBT, and 9.0471 with no screening. Immunochemical FOBT was dominant, as it was less expensive and more effective than both comparators.

The probabilistic analysis showed that both FOBTs had a favourable probability of being cost-effective, compared with no screening, but immunochemical FOBT had a better probability than guaiac FOBT.

The most influential inputs were the discount rate for life-years, the colorectal cancer incidence, and the costs of colonoscopy. Immunochemical FOBT generally remained dominant or was the most cost-effective strategy. This cost-effectiveness decreased at low cancer incidence rates. Immunochemical FOBT remained dominant compared with guaiac FOBT, regardless of the diagnostic cut-off point used (100 nanograms per mL in the base case).

Authors' conclusions
The authors concluded that immunochemical FOBT was more effective and less expensive than both guaiac FOBT and no screening.

CRD commentary
Interventions:
The rationale for the selection of the comparators was clear in that no screening was the usual care in the authors’ setting, while the two interventions were two types of FOBT.

Effectiveness/benefits:
The selection of the relevant sources of evidence was justified as the authors aim was to consider real-world data for the model, focusing on observed adherence to screening tests, which is often lower than that in formal clinical trials. The RCT used for this model was a pragmatic trial in a very large population-representative sample of individuals and an intention-to-treat approach was appropriately used. These were good features of the analysis. Cancer registries were valid sources for data, such as the long-term survival of cancer patients. Additional data were from published sources, which were not described. Life-years were an appropriate benefit measure, which captures the impact of the disease on survival; the key outcome for cancer patients.

Costs:
The cost categories were representative of the viewpoint stated. The resource use was from the pragmatic trial and was likely to have been collected in detail. Great attention was given to the cost of FOBT, including the invitation costs. The unit costs were from standard Dutch sources. An extensive sensitivity analysis was conducted on the cost parameters. The discount rate was reported, but the price year was not. In general, the economic analysis was conducted satisfactorily, but more details on the resource use would have been useful.

Analysis and results:
The results were extensively presented and an incremental analysis was used to synthesise the costs and benefits, to identify the optimal screening strategy. Both a probabilistic and a univariate sensitivity analysis were carried out to investigate the uncertainty; the findings were clearly reported and discussed. Conventional discounting was applied to the costs and benefits and the impact of variations in the discount rates was investigated in the sensitivity analyses. The
authors stated that their results could be transferred to other European countries, even those with different epidemiological data, as the findings were robust to changes in the model parameters.

**Concluding remarks:**
The analysis was satisfactorily carried out and the authors’ conclusions appear to be robust.

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