Small and diminutive polyps detected at screening CT colonography: a decision analysis for referral to colonoscopy


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 colonoscopic referral for polyps detected at computed tomography (CT) colonography. Referral for colonoscopy and polypectomy was not cost-effective for diminutive polyps, while for large polyps it was effective and economically attractive. For small polyps, the preferred strategy may have been CT colonography surveillance. The study was based on valid cost-effectiveness methodology, but the data sources could have been presented in more detail. Thus, caution is required when judging the validity of the authors’ conclusions.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
This study examined the cost-effectiveness, in a typical 60-year-old patient, of referral to colonoscopy and polypectomy for small, diminutive, and large polyps detected at computed tomography (CT) colonography.

Interventions
The strategy of performing colonoscopic polypectomy was compared with a strategy of no intervention. Diminutive polyps were 5mm or less, small were 6 to 9mm, and large were 10mm or more.

Location/setting
USA/hospital (out-patient).

Methods
Analytical approach:
This economic evaluation was based on a decision analytic model with a 10-year time horizon. The authors stated that the viewpoint of society was adopted in the sensitivity analysis, but indirect costs were excluded in the base case.

Effectiveness data:
The clinical data came from a selection of studies that appear to have been known to the authors. These sources included cohort studies, national databases, clinical trials, and meta-analyses. Only a few details on each source of data were reported. For example, the 10-year colorectal cancer (CRC) risk for an unscreened 60-year-old adult was derived from Surveillance, Epidemiology, and End Results (SEER) Program data. The key clinical endpoint was the accuracy of diagnostic procedures which was obtained both from recent clinical trials and from a meta-analysis of trials.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
Life-years (LYs) were the summary benefit measure and were discounted at an annual rate of 3%. Other outputs related to the screening results were also reported. For example, the number of diminutive, small, and large polyps that needed to be removed to avoid leaving behind one advanced adenoma or to prevent one CRC case was reported.

Cost data:
The economic analysis included the costs of diagnostic procedures and their related complications (i.e. bleeding,
perforation, and death) as well as the long-term treatment of CRC. The costs were presented as macro-categories and a few details on resource consumption were provided. All economic data were derived from published studies. Costs were in US dollars ($) and future costs were discounted at an annual rate of 3%. The price year was not explicitly reported.

Analysis of uncertainty:
A Monte Carlo simulation was carried out on several model inputs, which were varied simultaneously and randomly for 10,000 interactions. Alternative scenarios for the key model inputs, such as the prevalence of advanced adenomas and CT colonography performance, were also considered. For a societal perspective, indirect costs were included using data from a previous study.

Results
The estimated 10-year CRC risk for unresected polyps was 0.08% for diminutive, 0.7% for small, and 15.7% for large polyps. The number of polyps that needed to be removed to avoid leaving behind one advanced adenoma was 562 for diminutive, 71 for small, and 2.5 for large polyps. Similarly, 2,352 diminutive, 297 small, and 10.7 large polypectomies would be needed to prevent one case of CRC over 10 years.

The residual absolute 10-year CRC risk was 0.428% in the screened population and 1.4% in the unscreened population, but 0.34% of this residual absolute risk was due to CRC that was assumed to be unpreventable by screening for polyps.

The incremental cost per LY gained with polypectomy over no polypectomy referral was $464,407 for diminutive and $59,015 for small CT colonography-detected polyps, while removal of all large polyps was dominant, which means it was less expensive and more effective than no referral.

The sensitivity analysis, in general, did not substantially alter the base-case findings, especially for diminutive polyps. For small polyps, slightly more favourable findings were observed in the 50-year-old cohort, or with 100% specificity of CT colonography.

Authors' conclusions
The authors concluded that colonoscopic referral was not cost-effective for diminutive polyps detected at CT colonography screening, while removal of large polyps was effective and economically attractive. CT colonography surveillance may have been the preferred strategy for small polyps. The authors stated that further investigation of the natural history of small colorectal polyps was needed to provide more robust clinical data.

CRD commentary
Interventions:
The selection of no referral as the background comparator was appropriate as it represented the only alternative to the colonoscopic referral strategy.

Effectiveness/benefits:
The clinical data were derived from published sources, the details of which, such as study design, patient population, and type of screening strategy, were partially reported. This limits the possibility of making an objective assessment of the validity of the clinical inputs. However, the key model inputs appear to have been obtained from valid sources (a meta-analysis of trials or trials). The benefit measure reflected the impact of the screening strategies on the patients’ health and is a generalisable measure; LYs are comparable with the benefits of other health care interventions.

Costs:
The analysis of costs appeared to reflect the viewpoint of the health care payer as only the direct medical costs were included. The indirect costs were considered in the sensitivity analysis, and their inclusion was unfavourable for the less cost-effective strategies. The analysis of costs was not presented in detail. For example, the cost categories were presented, but details on the unit costs and quantities of resources used were not given. Furthermore, the price year was not reported and no description of the sources of costs was given.

Analysis and results:
The use of an incremental approach was appropriate for combining the costs and benefits, but the expected costs and benefits associated with the two strategies were not reported. The issue of uncertainty was extensively addressed using two different approaches, which were appropriate for investigating various areas of uncertainty. The authors noted that a number of simplifying assumptions were required in their decision model. In general, conservative assumptions were made and justified.

Concluding remarks:
The study was based on a valid cost-effectiveness methodology, but the sources used could have been presented in more detail. Thus, caution is required when judging the validity of the authors’ conclusions.

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