



**Health
Information
and Quality
Authority**

An tÚdarás Um Fhaisnéis
agus Cáilíocht Sláinte

Health technology assessment
(HTA) of a population-based
colorectal cancer screening
programme in Ireland

25 March 2009

**Advice to the Minister for
Health and Children**

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The Health Act 2007 states that one of the functions of the Health Information and Quality Authority is 'to evaluate the clinical and cost-effectiveness of health technologies including drugs and provide advice arising out of the evaluation to the Minister and the Executive.'

The advice to the Minister for Health and Children on a population-based colorectal cancer screening programme is outlined below.

As economic models incorporate a number of assumptions and are dependent on the quality of data available, the results are subject to a degree of uncertainty. Bearing in mind the estimates and assumptions that were used in this analysis, the following conclusions can be drawn:

- 1 Each of the three screening options (biennial FIT (55 to 74 years), biennial gFOBT (55 to 74 years) or once-off FSIG at age 60) proposed by the Expert Advisory Group would be considered highly cost-effective compared to a policy of no screening in the Irish healthcare setting and would compare very favourably with recent economic evaluations of other interventions that have been recommended and approved for reimbursement. These include evaluations of universal infant pneumococcal conjugate vaccination (€5,997/LYG) and universal infant hepatitis B vaccination (€37,018/LYG).
- 2 Compared to no screening, the following ICERs were obtained for the core screening scenarios:
 - Biennial FIT (55 to 74 years): €1,696/QALY
 - Biennial gFOBT (55 to 74 years): €4,428/QALY
 - Once-off FSIG at age 60 years: €589/QALY.
- 3 Of the three core screening options evaluated (FIT, gFOBT, FSIG), a screening programme based on biennial FIT for those aged 55 to 74 years would provide the greatest health gain (QALYS or LYG) compared to a policy of no screening. This strategy would also result in:
 - The highest estimated lifetime reduction in the incidence (14.7%) and mortality (36.0%) from colorectal cancer;
 - The highest percentage of lifetime cases of screen or surveillance-detected cancers (31.6% of all cancers versus 13.8% for gFOBT and 3.3% for FSIG) and adenomas. Screen-detected cancers are more likely to be detected at an earlier stage (stage I or II) than those detected symptomatically and therefore would be associated with improved survival rates.

- 4 In comparing the three screening options with one another:
 - Biennial FIT at ages 55 to 74 years would be the most effective screening option providing the greatest health gain (QALYs and LYG gained).
 - Biennial FIT at ages 55 to 74 would be more costly than once-off FSIG at 60 years. However, at an ICER of €2,058 per additional QALY, investing in FIT compared to FSIG would be considered highly cost-effective in the Irish healthcare setting.
 - A screening programme based on biennial gFOBT was found to be the least favourable option in the cost-effectiveness analysis, as it would be more costly and less effective than a combination of the other two options.
- 5 In summary, the results of the cost-effectiveness analysis show that a screening programme based on FIT would cost most more than programmes based on gFOBT or FSIG, however, it would provide the greatest health gain (QALYs or LYG) compared to a policy of no screening, while remaining highly cost-effective relative to the other screening options, and is therefore recommended as the optimal screening option.
- 6 The resource analysis showed that the resource requirements in the first ten years of programme based on biennial FIT at ages 55 to 74 years would be greater than those required for the other screening options. This includes resources for the diagnosis, management and surveillance of screen-detected adenomas and cancers.
- 7 In the first ten years of programme implementation and compared to a policy of no screening, a screening programme based on FIT at ages 55 to 74 years would:
 - Detect the highest number of adenomas and cancers
 - Avert more colorectal cancer cases and deaths in the population than either of the other screening options evaluated. Approximately 160 cases of cancer and 270 deaths from colorectal cancer would be avoided in year ten of a screening programme based on FIT. In the case of deaths averted, the benefit would be seen by the second year of programme implementation
 - Have the highest endoscopy requirement with an additional 11,000 to 15,000 colonoscopies being required each year
 - Result in the highest number of individuals suffering adverse consequences of screening (for example, major bleeding, bowel perforation or rarely, death from perforation) as a consequence of the higher number of colonoscopies
 - Require the largest number of resources to manage and treat screen-detected adenomas and cancers (for example, histopathology, radiology, radiotherapy and surgery) due to the higher yield of adenomas and cancers detected.

- 8 These resource requirements for a programme based on FIT, are based on an assumed screening uptake rate of 53%. Should uptake be considerably higher or lower than this, then, the resources required, yield of screen-detected cancers and adenomas, health outcomes gained (cases and deaths of colorectal cancer averted) and number of screening-related adverse events suffered would vary accordingly. However, in the context of all the resources examined as part of this evaluation, only a screening programme based on FIT has the potential to reduce several of these cancer resource requirements from year six onwards compared to continuing a policy of no screening.
- 9 A number of options were evaluated that would reduce the initial resource requirements associated with implementing population-based screening and to allow capacity to build gradually in the system. Of the options considered, a programme based on staggered implementation of FIT for those in the 55 to 74 year age group was found to be the optimal strategy and preferable to limiting screening to a restricted age group (such as 55 to 64-year-olds), as once fully operational, this option would provide the greatest overall health gain. The details of the staggered implementation (how many years it would take to encompass the entire 55 to 74 year age group) could be designed to match the speed at which capacity could be made available in the system.
- 10 Notwithstanding the fact that a programme based on FIT would be the optimal strategy in terms of cost-effectiveness, a screening programme based on biennial gFOBT in the 55 to 74 age group, or FSIG once at age 60, would still be considered highly cost-effective compared to a policy of no screening.
- 11 No particular areas of concern were noted in the ethical commentary when colorectal cancer screening was compared to other population-based screening programmes. It was noted, however, that while the absolute risk of screening-related adverse events for the individual is low, the risk of death from perforation of the bowel under a policy of biennial FIT at ages 55 to 74 at a population level, emphasises the importance of informed consent, the availability of trained personnel to assist with the informed consent process and the requirement for appropriate quality assurance in the governance and running of a screening programme to mitigate some of the risks that may be associated with implementation of screening in asymptomatic individuals.