

A systematic review on cost-effectiveness of colorectal cancer screening: Identification of an optimal strategy in Europe

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Research for a Life without Cancer

Background

The most commonly adopted colorectal cancer (CRC) screening strategies in Europe¹ are:

- Biennial guaiac-based faecal occult blood test (gFOBT)
- Biennial faecal immunochemical test (FIT)
- 10-yearly colonoscopy

Currently, there is no consensus on the most cost-effective modality².

Objective

To identify a cost-effectively optimal CRC screening strategy among the three through conducting a systematic review.

Methods: systematic review

Target studies & search period

- Cost-effectiveness analyses in Europe evaluating any of the three CRC screening strategies, published between 1 January 2010 and 31 December 2017

Databases searched

- PubMed, EMBASE, Web of Science, NHS EED, EconLit, US Tufts Cost Effectiveness Analysis Registry, and the list of Technology Assessments of the Centers for Medicare and Medicaid Services

Analysis

- Net monetary benefit approach was used to compare across all three strategies to identify optimal strategy
- Incremental cost-effectiveness ratio (ICER) was used to perform pairwise comparison between biennial gFOBT and FIT
- Costs were converted to 2017 Euro (1 £ = 1.14 € in 2017) using Consumer Price Index (CPI) for Health Care in respective countries and exchange rate from International Monetary Fund

Results

2 studies compared all three strategies

- Both found biennial FIT cost-effectively optimal at and above the willingness-to-pay (WTP) threshold of €10,000 per LYG/QALY gained (Table 1)

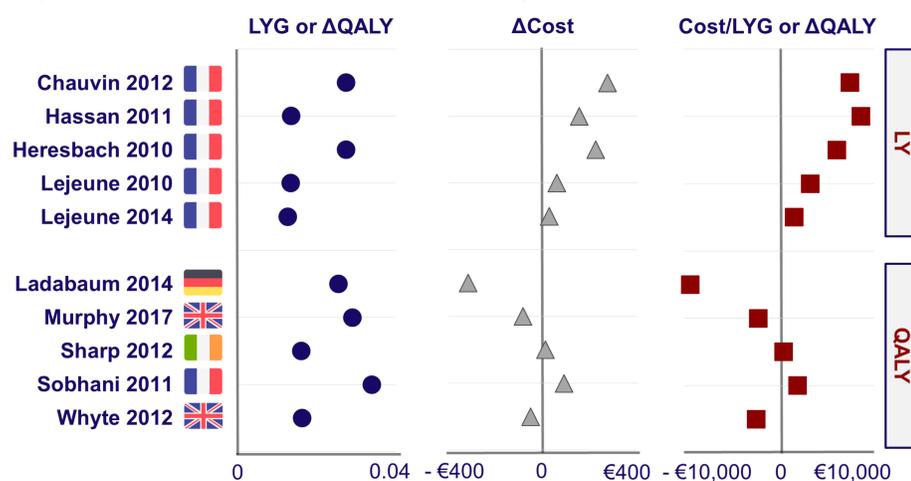
Table 1. The cost-effectively optimal strategy given different levels of WTP

	€5,000	€10,000	€30,000	€50,000	€100,000	Unit
Hassan 2011 	FOBT 2	FIT 2	FIT 2	FIT 2	FIT 2	Per LYG
Ladabaum 2014 	FIT 2	FIT 2	FIT 2	FIT 2	FIT 2	Per QALY

10 studies compared biennial FIT vs. biennial gFOBT

- FIT was cost-saving and more effective in two English and one German study (Figure 1)
- ICERs from other studies ranging from €1,586 to €8,646 per LYG or €489 to €1,981 per QALY gained

Figure 1. Biennial FIT compared with biennial gFOBT



Discussion

Possible contributing factors to the variations in results:

- **Adenoma/cancer progression probability** – higher probability of progression predicted more interval (late-stage) cancers for 10-yearly colonoscopy (e.g. Ladabaum 2014)
- **Late-stage cancer treatment costs** – more late-stage cancers with higher late-stage treatment costs resulted in higher overall costs for 10-yearly colonoscopy (e.g. Ladabaum 2014)
- **Colonoscopy costs** – higher colonoscopy costs thus higher overall costs for biennial FIT compared with gFOBT as more colonoscopies would be needed (e.g. Hassan 2011)
- **Model perspective and uptake rates of the strategies** – comparable across studies, not much contribution to the variations

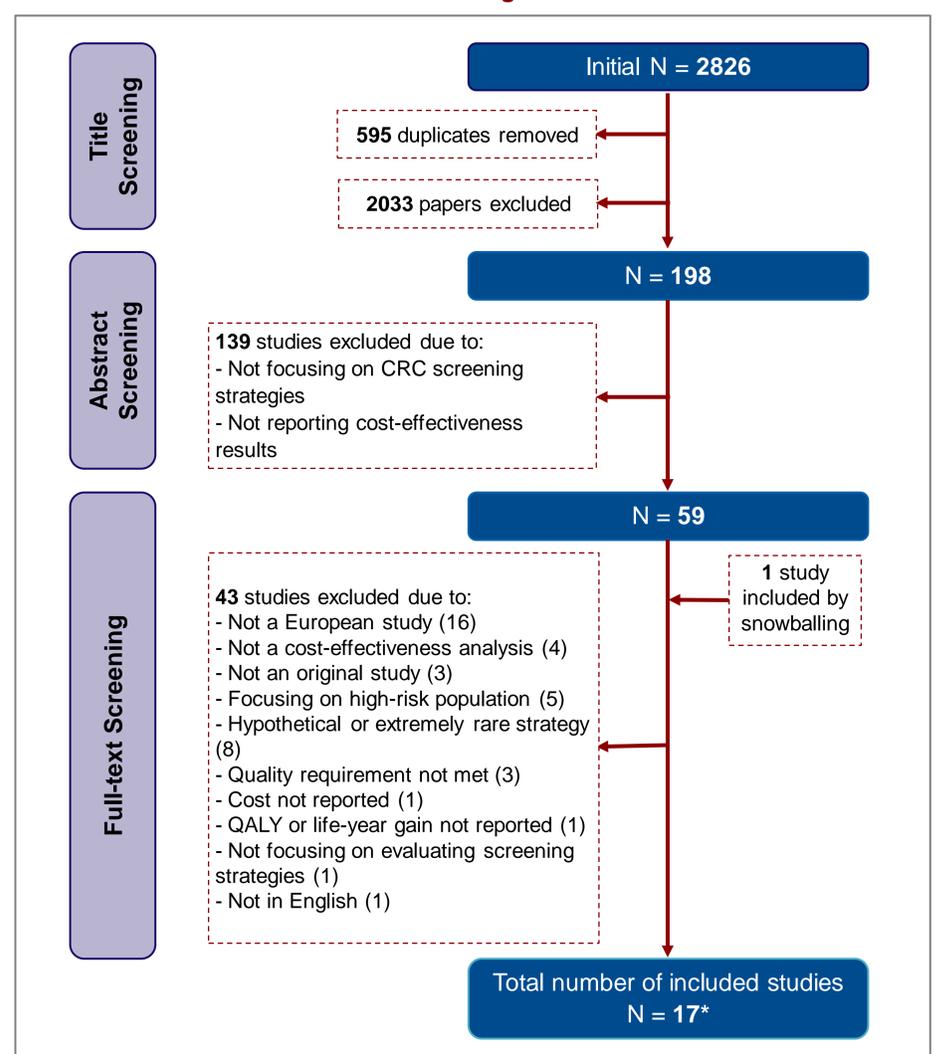
Conclusions

- **Biennial FIT** appeared to be the most cost-effective among the three at most WTP levels in two studies, while 10-yearly colonoscopy was shown to be less cost-effective than the stool-based strategies
- Between the two stool-based strategies, biennial FIT was shown to be highly cost-effective or cost-saving
- Our findings support the trend in Europe of shifting from gFOBT to FIT in CRC screening programmes, yet more evidence comparing the cost-effectiveness of the all three strategies in Europe is needed

References:

1. Schreuders EH, Ruco A, Rabeneck L, et al. Colorectal cancer screening: a global overview of existing programmes. *Gut*. 2015;64(10):1637-49
2. Lansdorp-Vogelaar I, Knudsen AB, Brenner H. Cost-effectiveness of colorectal cancer screening. *Epidemiologic reviews*. 2011;33(1):88-100

PRISMA diagram



*Full list of studies available upon request