

The Cost-Effectiveness of a Blood Test For Colorectal Cancer Screening



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ABSTRACT

THE COST-EFFECTIVENESS OF A BLOOD TEST FOR COLORECTAL CANCER SCREENING

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PURPOSE: Colorectal cancer (CRC) is the second leading cause of cancer death in Canada. Although regular screening with the fecal occult blood test (FOBT) can reduce CRC mortality, patient acceptance is poor. ColonSentry™, a Canadian technology, is the first blood test for CRC screening. An initial cost-effectiveness analysis assessed the value of ColonSentry in screening for CRC. **TARGET AUDIENCE:** Public healthcare system and private payers.

METHODS: A decision-analytic model was used to compare no screening to one cycle of screening with FOBT or ColonSentry in an average risk population aged 50 and over. The CRC detection rates for FOBT and ColonSentry were obtained from scientific sources. The healthcare system cost for CRC was obtained from a Statistics Canada model. Private payer costs were from the University of Toronto and Manulife Financial.

RESULTS: ColonSentry detected more early stage CRC, saved lives, and lowered the costs associated with late stage CRC. From the healthcare perspective, ColonSentry was cost-effective versus no screening (\$41,227/QALY) and FOBT (\$47,699/QALY). For private payers, ColonSentry saved more lives and cost less than FOBT (-\$40,124/QALY) or no screening (-\$34,726/QALY). From the societal perspective, ColonSentry was also dominant.

CONCLUSIONS: This economic evaluation demonstrated that ColonSentry can be cost-effective for CRC screening.

INTRODUCTION

CRC is the second leading cause of cancer death in Canada. In addition to the tragic loss of life, the financial burden of CRC has escalated over the past decade as a result of expensive new biologic therapies; a financial burden that is increasingly being borne by private payers and individuals. However CRC is also one of the most preventable and curable cancers when detected early by regular screening. For this reason, most health authorities recommend that average risk individuals over the age of 50 years undergo regular CRC screening. Yet at best only 15-20% of the population currently comply.

To facilitate broader CRC screening and earlier CRC detection, GeneNews™, a Canadian molecular diagnostics company, has introduced ColonSentry, the world's first blood test for CRC screening. The ColonSentry test uses a panel of seven mRNA biomarkers to identify patients with an increased current risk of CRC. The ColonSentry test provides a screening option for average risk patients including non-compliant patients, patients seeking monitoring in between colonoscopies and patients at risk of complications from invasive procedures like colonoscopy.

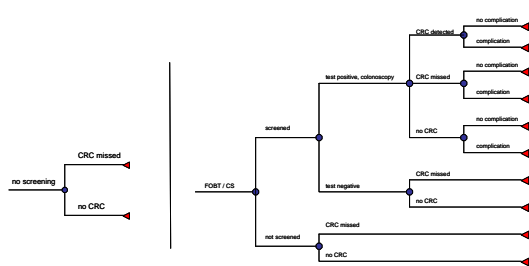


The ColonSentry test identifies an individual's current risk of CRC and need for follow-up diagnostics (i.e. colonoscopy). By prioritizing individuals, the ColonSentry can enrich the number of cancers detected for a fixed number of colonoscopies.

METHODS

Comparator: FOBT is the most commonly used CRC screening method in Canada and the least expensive. For these reasons, FOBT was selected as the comparator. No screening was also included as an alternative since most people are not compliant with CRC screening.

Model: A decision-analytic model in an average risk population aged 50 years and older was employed. The model was constructed according to the principles outlined in the Canadian guidelines for conducting economic evaluations of health technologies. The structure of the model is as follows:



Inputs^{1,2}: The parameters were largely obtained from an analysis of the potential impact of CRC screening in Canada based on the Statistics Canada's Population Health Model (POHEM) for CRC. The economic evaluation was conducted from the perspectives of the healthcare system, private payers, and society. Private payers are defined as third party payers (i.e.: insurers). The societal perspective includes the healthcare system, the insurer and individual (patient and caregiver).

Utility values³:	no CRC	0.91	Compliance rates:	FOBT ⁴	18%
	early CRC (local)	0.74		ColonSentry test ⁴	55%
	late CRC (distant/metastatic)	0.25			

⁴Assumption: compliance rate for PSA in men

Costs^{1,2}: Costs are reported in 2008 Canadian dollars. Costs considered in this analysis included treatment costs, screening costs, long term disability (LTD), short term disability (STD) and life insurance. The cost of healthcare perspective included physician visits, screening costs, confirmatory colonoscopy, complications from colonoscopy, and the lifetime cost of managing CRC. The societal perspective also factored in the cost of employee absenteeism (patient and caregiver) as well as co-pay and deductible charges. The costs are stated as average lifetime costs.

Outputs: The results are presented as an incremental cost-utility analysis (cost per quality-adjusted life-year gained, \$/QALY).

ACKNOWLEDGEMENTS

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RESULTS

All perspectives By encouraging compliance, screening with the ColonSentry test detected more CRC, extended survival, saved lives and reduced the amount spent on CRC cancer treatment. All perspectives are based on a model with 5000 average risk people.

The private payer perspective

Screening Approach	Incremental QALYs	Incremental Cost of Managing CRC Patients	Incremental Cost	ICER
ColonSentry vs. no screening	39.8	-\$2,161,792	-\$434,792	-\$10,916
ColonSentry vs. FOBT	33.6	-\$1,822,582	-\$95,582	-\$2,846
ColonSentry and FOBT vs. no screening	46.1	-\$2,501,002	-\$774,002	-\$16,797

The healthcare perspective

Screening Approach	Incremental QALYs	Incremental Cost of Managing CRC Patients	Incremental Cost	ICER
ColonSentry vs. no screening	39.8	-\$224,036	\$2,494,577	\$62,630
ColonSentry vs. FOBT	33.6	-\$54,198	\$2,420,472	\$72,080
ColonSentry and FOBT vs. no screening	46.1	-\$393,873	\$2,408,931	\$52,277

The societal perspective

Screening Approach	Incremental QALYs	Incremental Cost of Managing CRC Patients	Incremental Cost	ICER
ColonSentry vs. no screening	39.8	-\$2,555,665	\$488,747	\$12,271
ColonSentry vs. FOBT	33.6	-2,216,455	\$729,381	\$21,721
ColonSentry and FOBT vs. no screening	46.1	-2,894,875	\$88,364	\$1,918

The discrepancy between the abstract and this section is due to subsequent analysis

DISCUSSION

CRC screening programs in Canada suffer from low compliance and therefore low rates of early CRC detection. A barrier to high screening rates remains the perceived cumbersome nature and inconvenience of primary screening tools. A blood test for CRC screening will help overcome these limitations to facilitate higher rates of screening and earlier CRC detection.

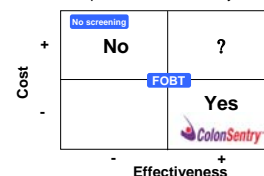
In this economic evaluation, screening with the ColonSentry test lowered the costs associated with CRC by increasing early-stage CRC detection and extending survival. From the private payer perspective, ColonSentry was dominant (produced better patient outcomes at lower costs) over no screening and FOBT. From the healthcare perspective, the ColonSentry test is cost-effective compared with the generally accepted oncology ICER benchmark. Screening is even more cost-effective for all perspectives when patients have the option of either FOBT or the ColonSentry test.

This analysis used conservative assumptions based on published data from scientific sources and Statistics Canada - the true economic benefits are likely to be higher. This model only reflects a one year cycle of screening. Regular screening with the ColonSentry test over time will yield a higher rate of early-stage CRC detection (i.e.: a higher program sensitivity), saving more lives and money. Other limitations included the omission of QALY discounting, incomplete private payer costs and outdated healthcare costs. Discounting and multiple screening rounds were not incorporated into this version of the model because these additions would have required additional assumptions thereby adding more uncertainty to the model.



CONCLUSION

The ColonSentry test, a blood test for colorectal cancer screening addresses the biggest CRC screening problem: patient compliance. In doing so, it enables earlier CRC detection for improved prognosis and reduced CRC costs. This economic analysis demonstrates that there are real and immediate benefits in adopting this new CRC screening technology including substantial cost-savings in LTD, STD, life insurance claims and expensive treatments by saving lives for private payers.



In the cost-effectiveness plane, ColonSentry was more effective and less expensive than no screening and FOBT for private payers.

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