COMPARING THE HEALTH AND ECONOMIC IMPACTS & COLONOSCOPY NEEDS OF SCREENING STRATEGIES FOR COLORECTAL CANCER (CRC) WITH FECAL IMMUNOCHEMICAL TESTS (FIT) AT DIFFERENT CUTPOINTS USING THE CANCER RISK MANAGEMENT MODEL (CRMM)

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Background & Objectives

- Colorectal Cancer (CRC) is the third most common cancer and second most common cause of cancer death
- Treatment of CRC has improved over the past two decades and survival rates have increased
- Screening has been shown to be effective in both decreasing the mortality and incidence of CRC through the removal of adenomatous polyps which are considered to be a precursor to most CRC
- Stool based screening tests have been shown to be effective in randomized trials
- Fecal Immunochemical Tests (FIT) are an attractive option with increased sensitivity compared to the gauaic stool tests used in the randomized trials
- FIT is a quantitative test and the threshold for positivity can be user specified - the effect of threshold choice is of interest

OBJECTIVE: *To assess the impact of changing the cutpoint used for FIT testing from the manufacturers recommended level of 100 ng to 50 ng using the CRC Cancer Risk Management Platform*

Materials and Methods

The CRMM* (version 2.1) is a continuous-time, Monte-Carlo micro-simulation model that allows the assessment of the effect of cancer control strategies on disease incidence, mortality, direct costs and economic impacts

- The CRC module of CRMM includes a natural history model where CRC is assumed to develop from adenomatous polyps: polyps are grouped by size and cancers grouped by stage - both are distributed into six anatomic locations through the colon & rectum
- Predisposition to develop polyps is included so that individuals vary in risk and polyps progress and regress stochastically but once cancer develops (initially stage 1) only progress to higher stages or diagnosis is permitted
- Cancer stage specific treatment pathways are included in the model along with associated survival probabilities and treatment costs
- Screening tests are included and characterised by the likelihood of a positive result given the patients disease state (none, polyp size, cancer stage) and anatomic location
- User selected parameters were as follows: Cohort age 44 in 2014 (born in 1969-1970); participation=100%; phase-in period=0, adherence=100%,

The likelihood of a positive test result (at 50ng and 100ng) were obtained from literature review where attention was restricted to studies included average risk asymptomatic patients, reported results at both levels and all subjects were evaluated by colonoscopy.

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FURTHER INFORMATION: www.cancerview.ca/cancerriskmanagement
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Results

Table1: The likelihood of a positive test by disease state used in the simulations.

Probability of a Positive Test Result by Disease State		
	FIT Threshold	
Disease State	50ng	100ng
1-5mm	0.05	0.04
6-9mm	0.18	0.15
10+mm	0.36	0.29
Cancer	0.82	0.75
Normal	0.05	0.04

Table 2: Estimated years of life gained, additional colonoscopies required, CRC cases and deaths prevented, additional costs and colonoscopies required per death prevented for screening scenarios with differing age eligibility, screening frequency (annual or biennial) and differing FIT threshold (100 or 50).

Scenario Age range/ interval/ FIT Threshold	Additional Years of Life per 100 Screened	Additional Colonoscopies per 100 Screened	CRC Cases Prevented per 100 Screened	CRC Deaths Prevented per 100 Screened	Additional Cost per 100 Screened ($1,000)	Colonoscopies per Death Prevented
BASECASE FIT Screening Scenario **50-74/2/100** Versus **NO Screening**						
BASECASE 50-74/2/100	27	62.4	3.76	1.99	-75.7	31.3
Altered Screening Frequency or Age Eligibility Versus **BASECASE**						
50-74/1/100	4	29.6	0.77	0.26	44.9	9.6
45-74/2/100	3	6.7	0.05	0.01	17.6	3.2
50-79/2/100	2	8.4	0.37	0.20	3.8	1.0
Altered FIT Threshold and, Screening Frequency or Age Eligibility Versus **BASECASE**						
50-74/2/50	2	9.5	0.32	0.12	-10.0	2.8
50-74/1/50	5	42.1	0.94	0.32	39.1	12.0
45-74/2/50	4	17.5	0.36	0.11	9.2	6.7
50-79/2/50	3	19.0	0.70	0.31	-14.1	4.1

Conclusions

- Base-case screening (age 50-74, biennial, 100ng threshold) resulted in increased life-expectancy and reduced total costs (no discounting) compared to no screening
- Increased age range for screening or increased frequency (annual) raised life expectancy but costs were increased compared to Base-case
- Reducing the threshold from 100 to 50ng resulted in increased life expectancy and reduced costs (no discounting) compared for each strategy considered

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