Using the Cancer Risk Management Model to Predict the Long-Term Impact of Colorectal Cancer Screening: A Study Protocol

Bonnie McIntosh, MPH, BA, [PhD Student] and Dr. Michael Wolfson, PhD, BSc, FCAHS, CRC [PhD Supervisor]

University of Ottawa, Department of Epidemiology and Community Medicine; Canada Research Chair in Population Health Modelling/Populomics

OBJECTIVES

Use model simulation to:
- Create ‘what if scenarios’ to explore the impact of FOBT and FIT
- Describe the learning process as a new user

BACKGROUND

Ontario (ON) has amongst the highest rates of colorectal cancer (CRC) incidence and mortality in the world.‡

- Increasing age is the largest risk factor §
- CRC screening tests can detect benign tissue abnormalities §

CRC screening tests:¶
- FOBT: Fecal Occult Blood Test
- FIT: Fecal Immunochemical Test

Which test is best for decreasing ONs CRC problem? FOBT, FIT, or Neither

METHODS

Figure 1. Process: From Start to Estimates

- Obtained Permission to use the Canadian Cancer Risk Management Model (CRMM-CRC 2.1)²
- User Learning Principles
  - Read User Guide
  - Learning by Doing
- Design: Monte Carlo Model Simulation Applied Case Study
- CRMM-CRC 2.1 Input Parameters: Risk Factors, Screening, Treatment, as well as CRC Incidence and Progression
- Create Scenarios
  - Base Case Scenario
  - Modify Parameters
- Outcome: Projections
  - Clinical
  - Cost

Figure 2. Concept: CRMM-CRC 2.1 Uses Monte Carlo Micro Model Simulation

CRMM-CRC 2.1

- Dynamic Web-Based Micro Simulation Platform
- Can Project Health and Economic Impact of Various Interventions
- How the CRMM-CRC 2.1 Uses Monte Carlo Micro Model Simulation
  - Simulates Individual Lives from Birth to Death
  - Uses Probability Distributions to Simulate Various Transitions

PRELIMINARY RESULTS

Table 1. Estimated Impact by Biennial Screening Modality for ON Adults Ages 50-74 (Year 2040)

<table>
<thead>
<tr>
<th>/screening modality</th>
<th>IMPACT 2040</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
</tr>
<tr>
<td>New CRC Cases</td>
<td>16,100</td>
</tr>
<tr>
<td>Incidence Rate*</td>
<td>0.95</td>
</tr>
<tr>
<td>Prevalence**</td>
<td>8.48</td>
</tr>
<tr>
<td>Mortality***</td>
<td>0.38</td>
</tr>
<tr>
<td>Total Cost ($ Millions)****</td>
<td>664</td>
</tr>
</tbody>
</table>

Note: *Rate is per 1000; **Person-Years; ***Cause-specific; ****Screening + Treatment

Figure 4. Useful Tools for Learning to use the CRMM-CRC 2.1

CONCLUSION: KEY MESSAGES

- The FIT is estimated to be best
- The CRMM-CRC 2.1 is a useful model for exploring parameters and projections

REFERENCES


CONTACT

Bonnie McIntosh, MPH, BA, PhD Student, University of Ottawa, Faculty of Medicine, School of Epidemiology and Community Medicine, 600 Peter Morand Cres. RM: 301G, Ottawa, ON K1G 5Z3
Phone: (586)961-9130
Email: bonmci031@uOttawa.ca

ACKNOWLEDGMENTS

This project is funded by the University of Ottawa (uOttawa), Dr. Michael Wolfson, and the uOttawa Destination 20/20 award. “This analysis is based on the Canadian Partnership Against Cancer’s Cancer Risk Management Model. The Cancer Risk Management Model has been made possible through a financial contribution from Health Canada, through the Canadian Partnership Against Cancer. The assumptions and calculations underlying the simulation results were prepared by “The Organization” and the responsibility for the use and interpretation of these data is entirely that of the author(s)”.

DATE: August 22, 2023