The Effect of Covid-19 on Colorectal Cancer Screening

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on behalf of CCGMC collaborators

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COVID-19 and Cancer Global Modelling Consortium (CCGMC)

The CCGMC aims to configure modelling platforms and to estimate the potential impact of COVID-19 on cancer therefore providing informed advice to governments, particularly those in low- and middle-income countries, as they rise to this overwhelming health systems challenge.

WORKING GROUP

Three main work streams: impact on cancer treatment and outcomes, screening, and cancer prevention.

- WG1 Treatment
- WG2 Screening
- WG3 Prevention

COLLABORATIONS

The CCGMC comprises over 250 members representing 38 countries worldwide.

Potential mechanisms of impact on cancer outcomes

- **DECREASED SURVIVAL**
  - Direct "biological" impact on survival
  - Impact of treatment disruptions
  - Effects on co-morbid conditions
  - Competing mortality risk from COVID

- **DELAYED DIAGNOSIS**
  - Disruptions to screening programs
  - Delays in symptomatic presentation

- **IMPACT ON CANCER RISK**
  - Direct "biological" impact on risk
  - Effect of risky behaviours during crisis

Social distancing measures (including lockdowns) and redirection of health system resources can have negative effects on people with cancer and ultimately on cancer survival, such as:

- Delays in diagnosis and urgent referrals
- Delays in cancer treatment, e.g. chemotherapy or surgery being postponed
Potential impacts of COVID-19 on cancer

- Direct impact on survival in cancer patients
- Indirect impact of treatment disruptions
- Direct or indirect impact on co-morbid conditions

• Disruptions to screening programs
• Delays in symptomatic presentation

- Direct impact on cancer risk
- Effect of risky behaviours during crisis
- Impact on primary prevention programs
Aims of the CCGMC CRC screening work

1. To harness established and validated microsimulation model platforms in countries for which these are available, to:
   • Simulate the short and long term impact of CRC disruptions on cancer incidence and mortality considering a number of scenarios for disruption extent and duration
   • As detailed data on disruptions become available, to dynamically incorporate such information to update model predictions

2. To evaluate the effectiveness (and cost-effectiveness) of possible recovery strategies considering situations where:
   • Resources and capacity to enable ‘catch-up’ are unconstrained; or
   • (More realistically) where prioritisation decisions need to be made for screening or referrals to colonoscopy.

3. To extend these methods to inform a responsive multi-country platform:
   • By using detailed modelling in a few countries to inform pre-disruption screening modelling for countries with similar programs
   • Combined with country-level burden-of-disease and emergent disruption information.
Example microsimulation platform: Policy1-Bowel

Normal mucosa

- Benign diminutive adenoma (<6 mm, LG dysplasia and no villous component)
- Benign small adenoma (6-9 mm, LG dysplasia and no villous component)
- Advanced adenoma (≥10 mm and/or HG dysplasia and/or contains villous component)

Bowel cancer

- Small sessile serrated adenoma (size<10mm)
- Large sessile serrated adenoma (size≥10mm)
- Small hyperplastic polyps (size<10mm)
- Large hyperplastic polyps (size≥10mm)

**Adenoma-carcinoma pathway (~85%)**

**Serrated pathway (~15%)**

References:
2. Lew et al. 2018 Int. J. Cancer
3. Lew et al. 2018 Cancer Epidemiol Biomarker Prev
5. Worthington et al. 2020 Public Health
7. de Jonge & Worthington et al. 2021 Lancet Gastroenterol Hepatol

Simulation of millions of virtual individuals per age-cohort through life from age 20-89 years.
Three-country, four-model initial comparative analysis

Canada
*OncoSim*
- Biennial FIT test
  - 50-74
  - Participation ~73%
- COVID-19: program pause

The Netherlands
*ASCCA & Miscan-Colon*
- Biennial FIT test
  - 55-75
  - Participation ~73%
- COVID-19: program pause

Australia
*Policy1-Bowel*
- Biennial FIT test (2-samples)
  - 50-74
  - Participation ~41%
- COVID-19: lower participation
(Hypothetical) Screening disruptions due to COVID-19

Our approach was to model hypothetical disruptions to screening, and alternative management and behavioural change after a disruption:

- 3, 6, 9 or 12 month pauses to all iFOBT screening;
- Possibility of catch-up screening for those who missed a screening round
- Possibility of decreased participation for 12 months following the disruption, due to behavioural and/or health system changes.
Impact of disruptions +/- catchup

Impact of disruptions +/- catchup

Short term
Long term

Drop in CRC diagnoses in 2020

Number of CRC diagnoses

- MISCAN-Colon
- ASCCA
- OncoSim
- Policy1-Bowel

- 6 months disruption
- 6 months disruption with immediate catch-up

Additional CRC incidence, 2020-2050

- 803
- 1,803
- 2,859
- 3,552

- MISCAN-Colon
- ASCCA
- OncoSim
- Policy1-Bowel

- 6 months disruption
- 6 months disruption with immediate catch-up

Additional CRC Deaths, 2020-2050

- 678
- 881
- 1,326
- 1,961

- MISCAN-Colon
- ASCCA
- OncoSim
- Policy1-Bowel

- 6 months disruption
- 6 months disruption with immediate catch-up

http://doi.org/10.1016/S2468-1253(21)00003-0 (*joint first authors)
Impact of disruptions to colonoscopy
(Australia as an example)

*proxy for access, availability and willingness to undertake colonoscopies*

Consideration of prioritised referrals to colonoscopy (Australia as an example)

C. Policy1-Bowel - Australia

Monthly change in colonoscopy demand during the recovery period compared to usual demand (%)

Excess CRC-related deaths in 2020-2050 prevented by performing catch-up (%)

6 months recovery

12 months recovery

24 months recovery

FIT threshold, μg HB/g faeces

20  25  30  40  50  60

Source: van Wifferen et al 2021
Publication under review
The CCGMC ultimately intends to reflect the combined impact of CRC screening & treatment disruptions.
The CCGMC also intends to establish a ‘COVID & cancer’ observatory

CCGMC Observatory
Living systematic reviews and modelling results
Provide ongoing live evidence assessments

Risk of death from COVID for people with cancer
Risk of infection with COVID for people with cancer
Smoking behaviour

COVID vaccine impact and outcomes in cancer patients (?)
Impact of diagnostic and treatment delays (?)
Alcohol, obesity and other risk factors (?)

Screening-related disruptions & recovery strategies
Other topics to consider?

Initial systematic reviews and modelling & potential extensions to current work

Facility to track other relevant SRs and activities underway by other groups

Update with continually refined inclusion criteria designed to capture only best evidence
Conclusions

• Modelling had already demonstrated its importance to pre-pandemic policy-making
• The crisis has emphasised the importance of timely access to information on screening program metrics
• As the data become available it can be used to update and improve modelled predictions
• Disruptions to colonoscopy referrals for screen-positive individuals could have a major impact, so novel prioritisation strategies for colonoscopy deserve consideration
• A silver lining is that this changes the framing (and might accelerate) consideration of implementing risk-based screening approaches.
“It is crucial that, if disrupted, screening programmes ensure participation rates return to previously observed rates and provide catch-up screening wherever possible, since this could mitigate the impact on colorectal cancer deaths.”

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