COVID-19 and Cancer Global Modelling Consortium (CCGMC)

Working Group 2 – Screening

Breast Project Team

Co-chairs:

Jonine Figueroa: University of Edinburgh
Carolyn Nickson: University of Sydney

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WG2 – Screening: breast cancer

- 20 members, from 15 countries
- Joint chairs: Jonine Figueroa (U Edinburgh), Carolyn Nickson (The Daffodil Centre/University of Melbourne), Karen Canfell (The Daffodil Centre)

Group-specific aims
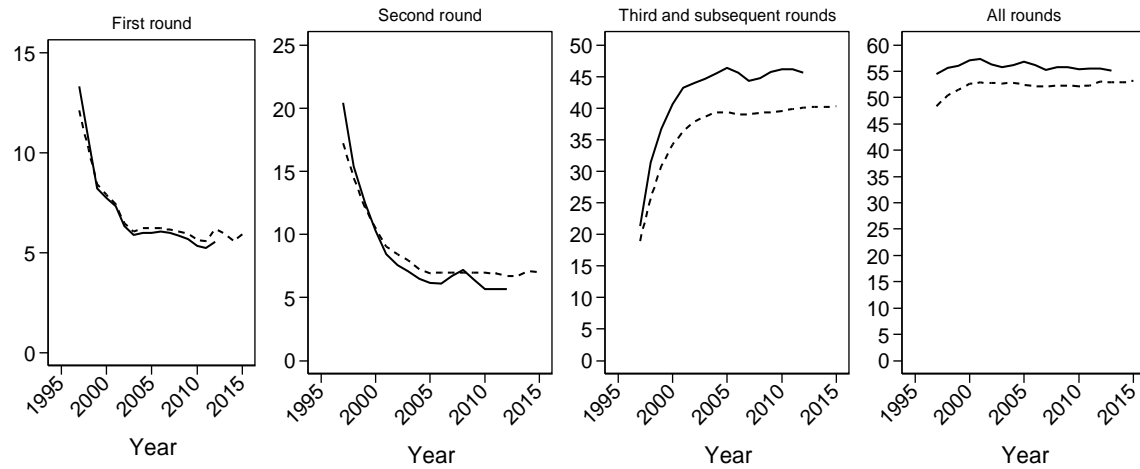For various settings, in a comparative framework:

1. **Document/estimate the disruption** to breast screening due to COVID

2. **Use existing well calibrated and validated model platforms** to estimate the impact of this disruption on breast cancer incidence, delayed diagnosis (esp. staging via tumour size, nodal involvement) and mortality (additional deaths)

3. Characterise impact on **referrals to treatment services**, e.g. rates and case-mix

4. Estimate the impact and cost-effectiveness of **catch-up/adaptation strategies**

Available models

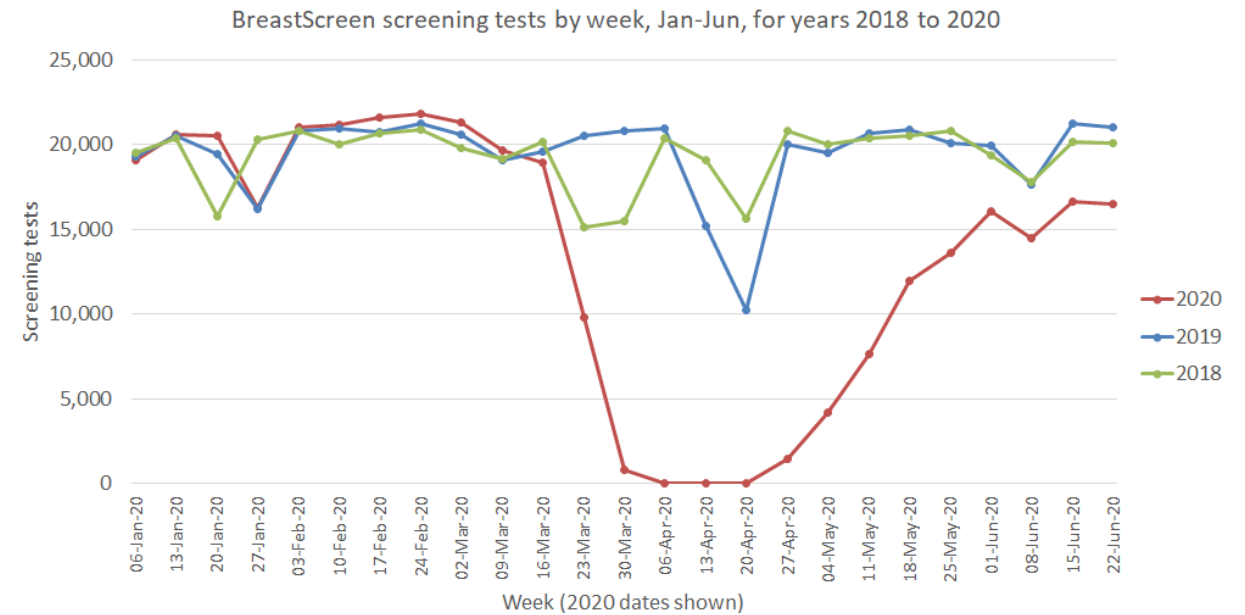| Model	Country	Screening practice
Policy1-Breast, Carolyn.nickson@nswcc.org.au	Australia	Digital mammography, biennial screening from age 40, targetted to 50-74 (some targetted annual screening)
SIMRiSC , m.j.w.greuter@umcg.nl	Several	High risk familial breast cancer
UCL Multistate model, n.pashayan@ucl.ac.uk	UK and others	Breast screening 2-view digital mammography every 3 years in women 50-69 years of age
1-2 CISNET, alagoz@engr.wisc.edu	USA	Multiple
MISCAN (breast) , n.vanravesteyn@erasmusmc.nl	Netherlands, Europe	Mammography (digital/tomosynthesis), biennial screening from age 50-75 *Alternative modalities, intervals and age ranges possible*

Australian breast screening participation

Policy1-Breast simulations (pre-COVID)

First round | Second round | Third and subsequent rounds | All rounds

—— Observed ⋯⋯ Simulated

COVID impact on observed national throughput

BreastScreen screening tests by week, Jan-Jun, for years 2018 to 2020

2020
2019
2018

Week (2020 dates shown)

Source: Cancer screening and COVID-19 in Australia, AIHW web report Cat. no: CAN 136

Policy1-Breast COVID response modelling

Commissioned by Australian Government Department of Health

Phase 1 (April-May 2020):
- Screening pause: 1, 3, 6, 12 months
- Ongoing reduced screening capacity, various levels (50% - 100%)
- www.health.gov.au/resources/publications/simulated-impacts-of-covid-19-scenarios-on-cancer-screening-summary-report
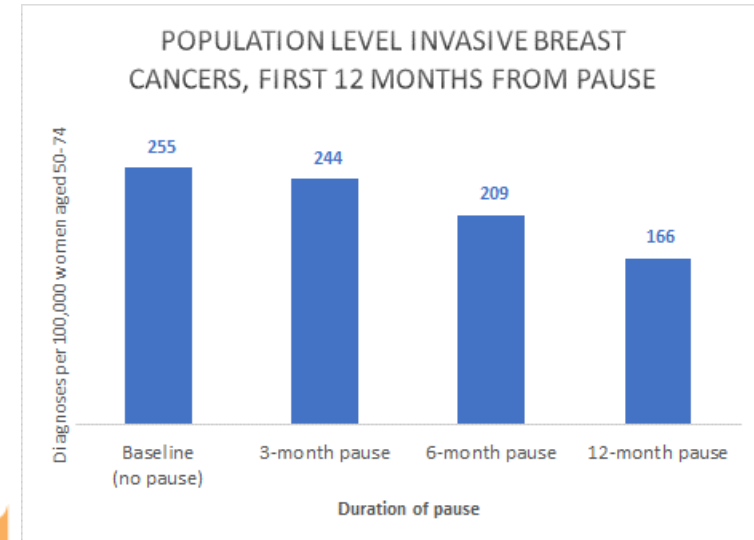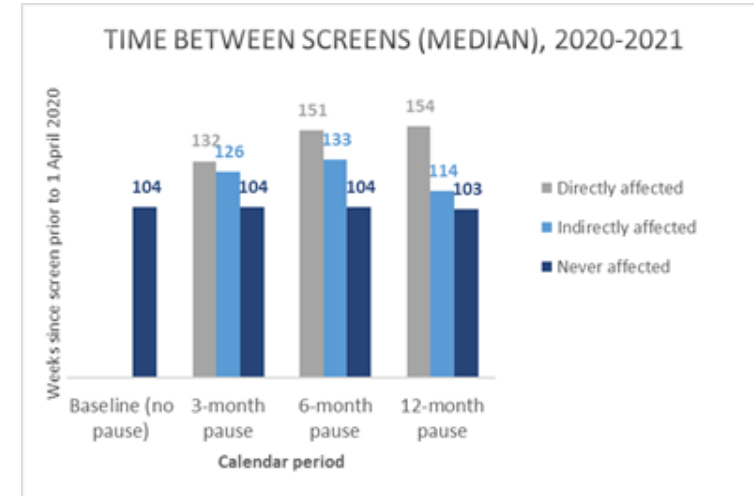
Phase 2 (underway)
- Observed screening pause and recovery Jan-Jun 2020
- Ongoing reduced screening capacity, various levels (50% - 120%).
- Targetted and untargeted approaches to assigning available screens, based on BreastScreen practices.

Key outcomes:
- Screening delays (time between screens)
- Clinical outcomes (size, nodal involvement, cancer rates)
- Screening program outcomes (recalls to assessment, false positives, interval cancers)
- Mortality
https://www.health.gov.au/sites/default/files/documents/2020/09/covid-19-scenario-modelling-for-cancer-screening-programs-the-breastscreen-australia-program.pdf
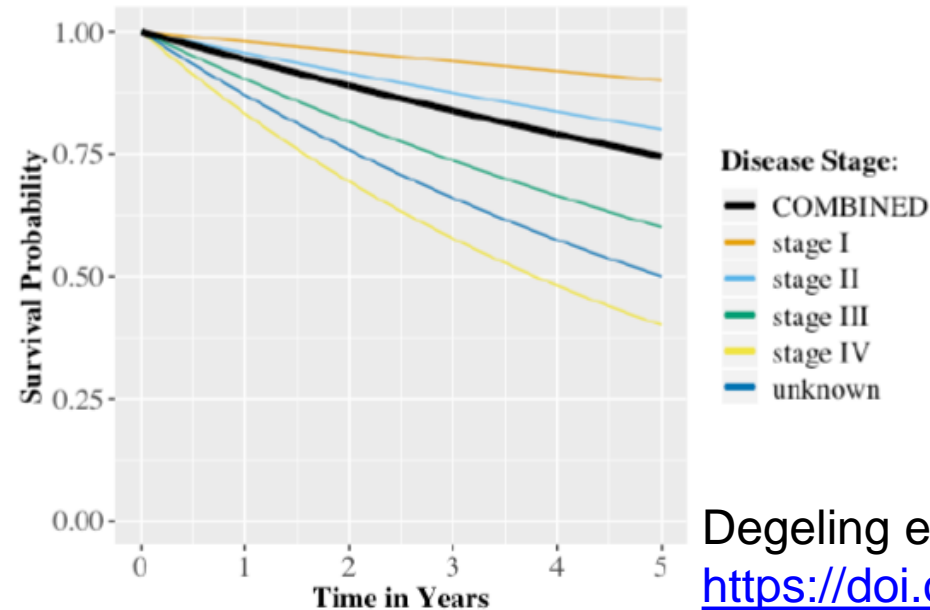

TIME BETWEEN SCREENS (MEDIAN), 2020-2021

POPULATION LEVEL INVASIVE BREAST CANCERS, FIRST 12 MONTHS FROM PAUSE

Stage-shift model for excess mortality estimates

Distribution of Stage at Treatment Initiation

Stage-specific and COMBINED Overall Survival

Degeling et al., medRxiv preprint
https://doi.org/10.1101/2020.05.30.20117630

Stage distribution of expected population of cancer cases in 2020 and excess mortality over 5 years in Scotland, UK
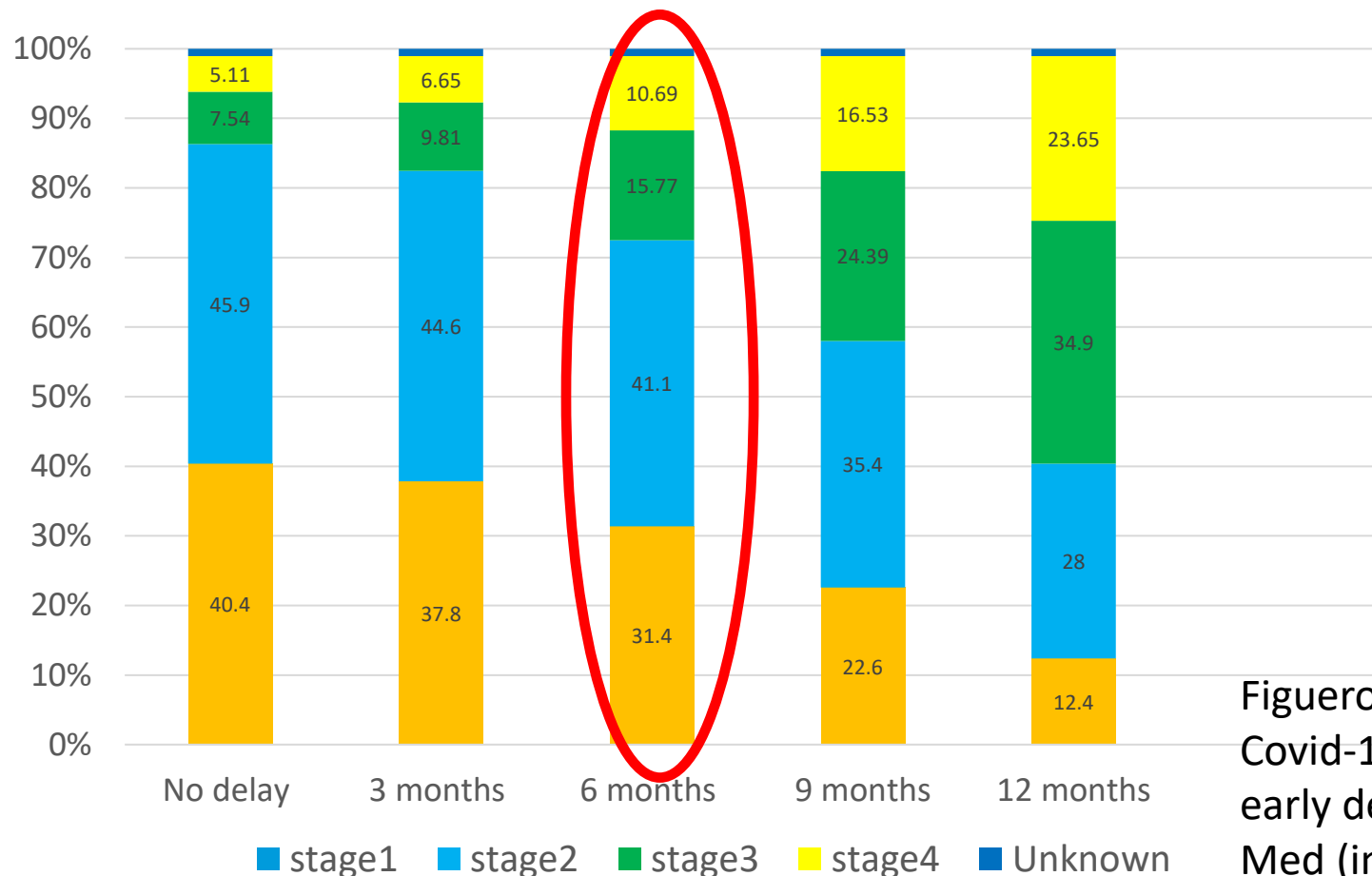
Figueroa, *et al.* The impact of the Covid-19 pandemic on breast cancer early detection and screening Prev Med (in press)

Estimated excess mortality among screen-detected and clinically detected groups in Scotland using stage-shift model

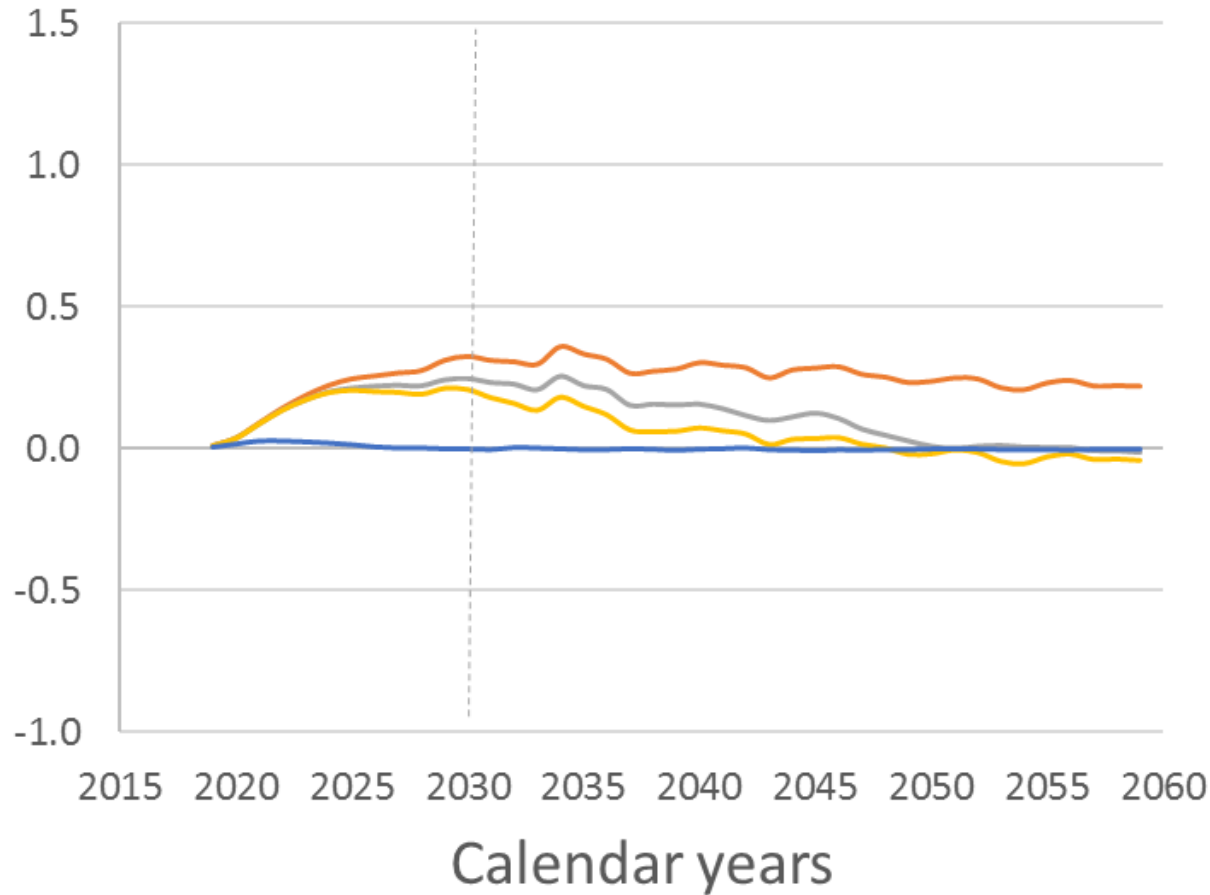| Duration of disruption	Excess mortality (%**) (95% CI)	Excess mortality (N*) (95% CI)	Screen detected Excess mortality (N) (95% CI)	Clinically detected Excess mortality (N) (95% CI)
3 months	6.3 % (5.6-6.9)	32.8 (29.6-36.4)	10.4 (9.2-12.0)	22.4 (20.4-24.8)
6 months	22.3 % (20.3-24.3)	116.8 (106.2-127.4)	37.4 (32.8-43)	79.4 (72.8-86)
9 months	44.8 % (41.1-48.4)	234.6 (215.4-253.7)	79.3 (67.2-87.2)	166.3 (146.4-170.1)
12 months	71.5% (66.2-76.9)	374.8 (347.0-402.8)	127.0 (109.2-140.5)	262.1 (234.9-267.9)

Figueroa, *et al.* The impact of the Covid-19 pandemic on breast cancer early detection and screening Prev Med (in press)

MISCAN Restart scenarios – after 6 months disruption

	Population affected	Duration of effects	Changes in stopping age
Everyone delay	Total population	The delay will exist forever	Stopping ages stays 75. Screens delayed to age 76 are cancelled
First rounds no delay	Total population minus first rounds after 2020	All future rounds are delayed for women eligible for screening in 2020	Stopping ages stays 75. Screens delayed to age 76 are cancelled
Continue after stopping age	Total population	The delay will exist forever	The stopping age increases to 76.5 for all women
Catch-up after stop	Women due for a screening appointment during the disruption	The delay is caught up in the second half of 2020	The stopping age increases to 76.5 for women invited for their last round in 2020

Results – mortality

Kregting LM, Kaljouw S, de Jonge L, *et al.* Effects of cancer screening restart strategies after COVID-19 disruption. Br J Cancer 2021; 10.1038/s41416-021-01261-9

WG2 – Screening: breast cancer

Countries	Screening pauses
Australia	1 month (March-April)
Canada	~4 months (March-June), with regional variation
Germany	2 months (March- April)
Italy	2 months (March-April) –with regional variation
The Netherlands	4 Months (March- June)
United Kingdom	6 Months; March-August

- Common themes - range of assumed pauses to organised breast screening (e.g. 3, 6, 9 or 12 months), focus on tumour staging and mortality as outcomes
- The effects of a disruption are dependent on the chosen restart strategy
- Immediately catching up minimises the impact, but requires a very high capacity
- Increasing the stopping age (so no screens are omitted) requires 'normal' capacity and will result in small effects on incidence and mortality
- Emerging cancer registry and screening program data will be valuable for future modelling
- Priorities for future modelling exercises include population level outcomes, treatment intensity, inequities within populations, high-level modelling in LMIC settings, stakeholder engagement