How long until you turn 55?

Let me tell you a story

Everybody knows your name...

















How Ireland's Colorectal Screening Programme Could SAVE MORE LIVES, SAVE MONEY & Stay Within Existing Colonoscopy Capacity Limits: Evidence From The MISCAN Microsimulation Model







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Funding: HSC/NCI Health Economics Fellowship

Background

- 'BowelScreen' strategy informed by a HIQA HTA (2009)
- Assessed FOBT, FIT and FISG
- 2 year intervals only (FOBT/FIT)

•	3 age ranges:	FOBT/FIT	FISG
		55-74	55
		55-64	60
		65-74	

- Faecal Immunochemical testing (FIT) planned cut-off 100ng Hb/ml
- Capacity constraints not considered





Background: Policy Revision Timeline

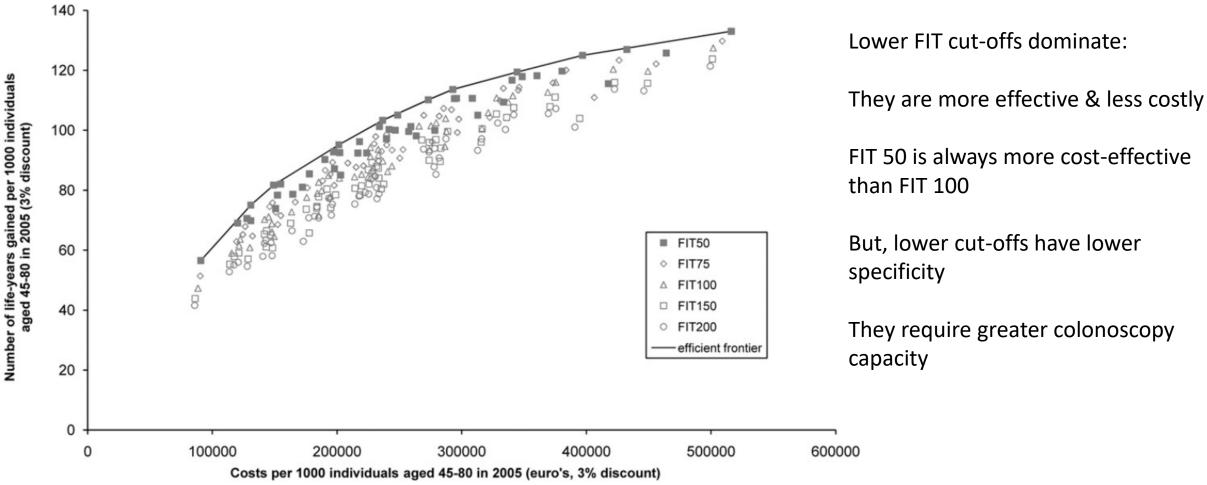
- 2009 HIQA HTA: FIT 100: <u>55-74</u> year olds
- Sharp et al (2013) capacity planning analysis
- 2012 October Roll-Out: FIT <u>100</u>: <u>60-69</u> year olds

- 2014 April Revision: FIT <u>225</u>: 60-69 year olds
- FIT positivity rate fell from 8% to 4.1%





Background: Wilschut et al (2011)



Source: Wilschut et al (2011) Figure 1





Test Characteristic Assumptions

		Sensitivity per lesion, %				
			Adenoma			CRC
FIT Cut-off Level	Specificity	≤5mm	6-9mm	≥10mm	CRC early	CRC late stage
(ng/Hb/ml)*	(per person, %)				stage	_
50	95.79	0.0	9.6	16.1	65.0	90.0
100	97.76	0.0	4.4	13.1	52.0	83.5
200	98.70	0.0	2.5	10.3	50.0	82.5
Colono	scopy ⁴²	75.0	85.0	95.0	95.0	95.0





Methods: Considering Other Screening Intervals

- The original HIQA analysis only considered 2 year screening intervals
- Reducing the screening frequency will reduce screening effectiveness....
- But, this may be offset by offering a broader screening age range with a more cost-effective FIT cut-off
- We examined other screening strategies to see if they were effective while remaining within our current colonoscopy capacity constraint



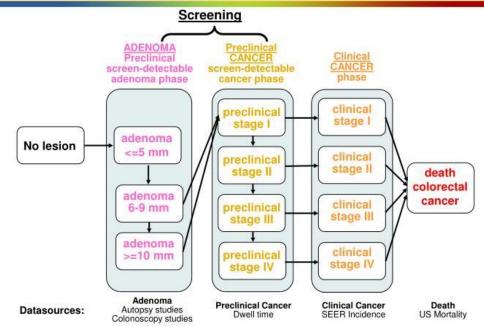


Methods

- Using MISCAN Colon microsimulation model
- Established base case using biennial FIT with 200 ng Hb/ml cut-off in 60-69yrs
- Then varying:
 - FIT cut-off
 - screen intervals
 - starting ages
- 315 alternate strategies were simulated for comparison
- Estimates generated net costs, QALYs and number of colonoscopies required to conduct the programme

Modeling of natural history of CRC



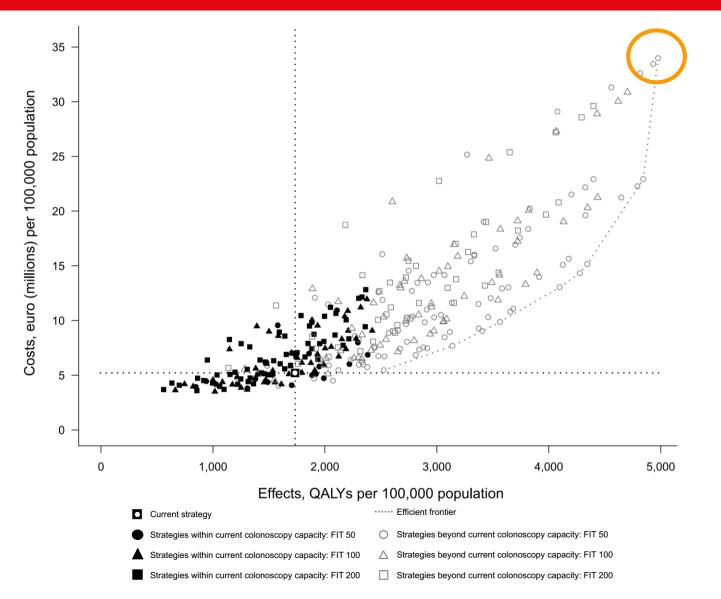


Strategy Charact	Strategy Characteristics				
Screening interval (Years) 1/2/3/4/5					
Start age (Years) 45/50/55/60/65/70					
Stop ages (Years)	70/75/80				
FIT cut-off levels (ng Hb/ml)	50/100/200				





Results: By FIT Cut-off and Colonoscopy Capacity

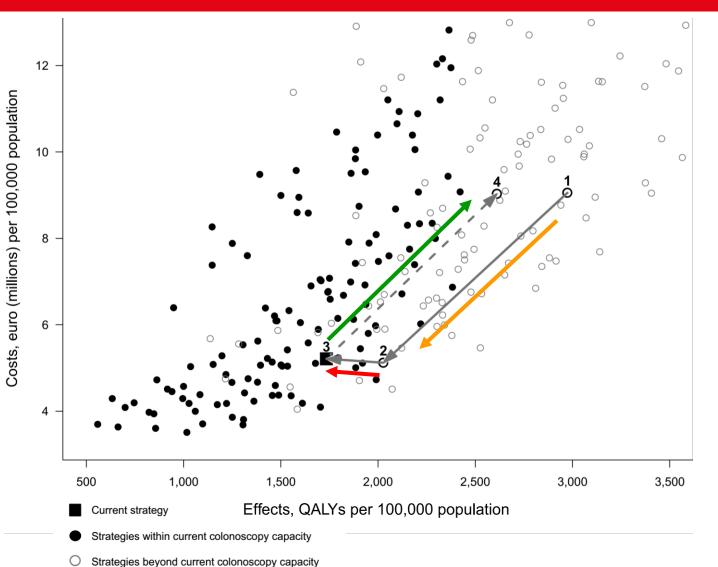


- The most effective strategy uses annual FIT50 screening 45-80yrs
- The efficient set only includes a FIT 50 ng Hb/ml cut-offs
- 126 alternative strategies are within current capacity
- Some are more effective than the current strategy





Results: Policy Changes to Date

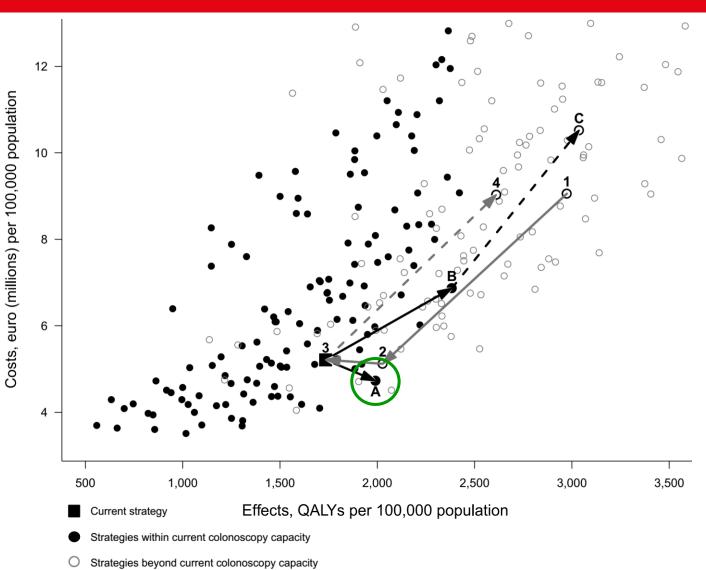


- 1-2 shows the age restriction from 55-74 to 60-69
- 2-3 shows the FIT increase from 100 to 225 ng/ml
- 3-4 shows the planned age expansion back to 55-74





Results: Potential Policy Alternatives

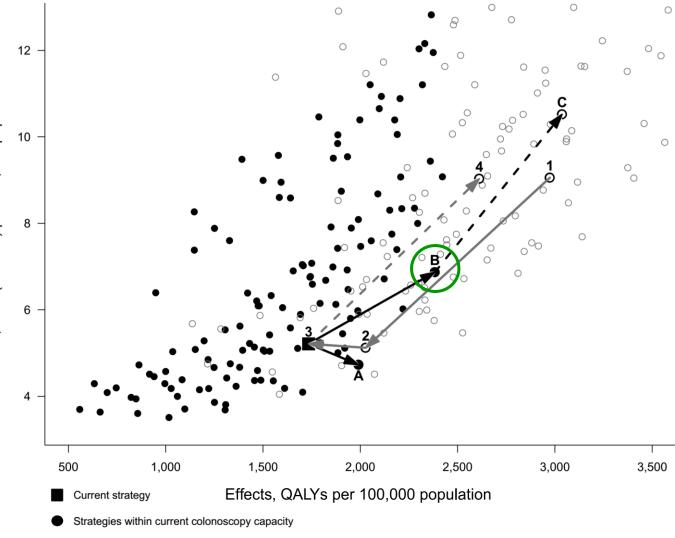


- Policy A uses FIT 50 every 4
 years between 60-72
- Feasible within current capacity
 - It improves outcomes & reduces costs
 - It prevents 13% more CRC deaths than currently





Results: Policy Alternatives



- Policy B uses FIT 50 every 5 years between 55-75
- Feasible within current capacity
 - It improves outcomes but increases costs
 - It prevents 29% more CRC deaths than currently



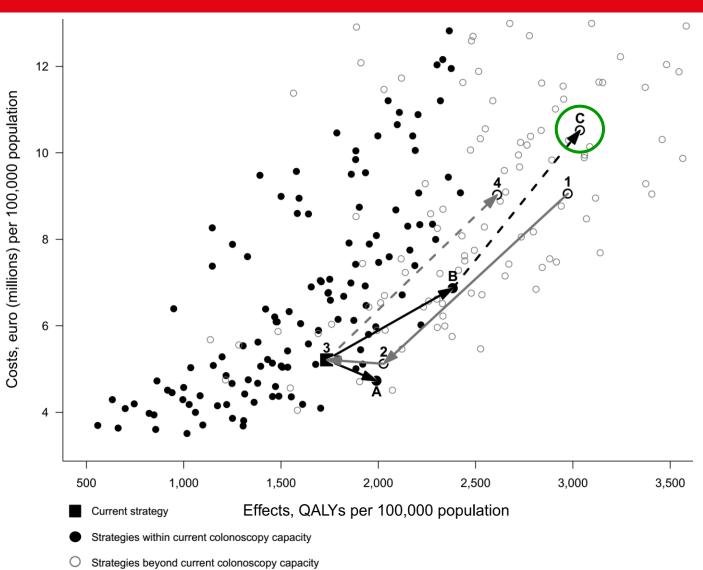
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Strategies beyond current colonoscopy capacity

С

Results: Policy Alternatives

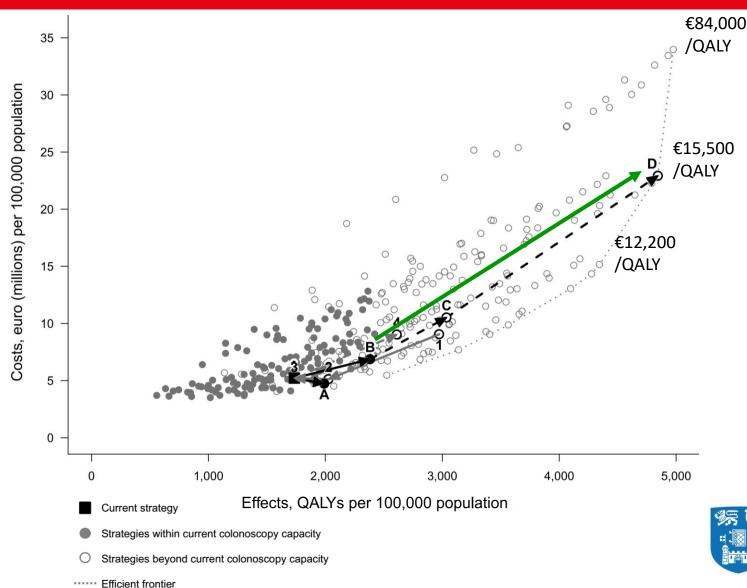


- Policy C uses FIT 50 every 4
 years between 50-74
- Requires capacity expansion
 - It improves outcomes but increases costs
 - It prevents 5% more CRC deaths than planned expansion





Results: Ultimate policy goal: annual screening?



- We should not overlook the ultimate policy objective
- Annual screening between 50-80 is cost-effective
- **Requires radical expanded** colonoscopy capacity



The University of Dublin

Results: Strategies in Detail

Identifier	Strategy	Age range	Interval	Cut off	QALYs per 100,000	Cost (€) per 100,000	Colonoscopies per 100,000	Change in QALYs, %	Change in Costs, %	Change in Colonoscopies, %
1	Initial HIQA Recommendation	55-74	2	100	2,974	9,055,871	101,699	71	74	119
2	Age restriction	60-70	2	100	2,027	5,121,535	66,250	17	-2	43
3	Approximation of current strategy using 200 ng HB/ml	60-70	2	200	1,734	5,214,017	46,372	0	0	0
4	Planned age expansion	55-75	2	200	2,611	9,031,347	73,537	51	73	59
A	Optimal with cost saving	60-72	4	50	1,991	4,729,132	43,621	15	-9	-6
В	Optimal within capacity	55-75	5	50	2,383	6,869,370	45,430	37	32	-2
С	Optimised with expanded capacity	50-75	4	50	3,037	10,521,322	36,061	75	102	-22
D	Optimal overall	50-80	1	50	4,844	22,926,425	366,809	179	340	691





Lessons

- Do not limit strategies for comparison before you simulate
- Comparator omission is relevant both within and beyond capacity constraints
- Capacity planning should be integrated with CEA
- Decision maker should be prepared to cut screening intensity to achieve screening coverage





Discussion

- The potential exists to:
- SAVE MORE LIVES,
- SAVE MONEY &
- Stay Within Existing Colonoscopy Capacity Limits
- Decision makers may need to consider updating the BowelScreen cost-effectiveness
- Benefit of consultation with endoscopy committee/ Irish Cancer
 Society





What is measured ... is what gets done

#	Objective/Action	Performance Indicator	Target	Target Date	End 2022 Position
)	Achieve target coverage rate for CervicalCheck	Percentage five year rolling coverage of	80%	2017-2026	Jan-Dec 2022: 73.5% ⁴
		CervicalCheck in screening population			(NSS)
10	Achieve target uptake rate for BowelScreen	Percentage uptake rate for BowelScreen	60%	2020 (interim	Jan-Dec 2022: 43.2% ⁴
		screening population		measure of 45%	(NSS)
				by end 2018)	
1.4	Complete controlication of concernment consists	Descentees of comparise conducted in	059/	Mariana taraat	

6.4. Colorectal Cancer Screening

BowelScreen, the National Bowel Screening Programme, was introduced in 2012 with a phased implementation plan targeting men and women aged 60-69 years. The total eligible population is approximately 0.5m, and the first round of screening was completed at the end of 2015 (KPI no. 10). BowelScreen is one of the first national screening programmes to utilise the faecal immunochemical test (FIT) as the primary screening test. From 2016, BowelScreen has moved to a two year round of screening, rather than the initial three year round. Efforts will continue to increase uptake rates, including addressing the lower uptake rate among men when compared to

Recommendations

5 The HSE will ensure that the appropriate endoscopy capacity is provided in hospitals to allow for the expansion of BowelScreen to all aged 55-74 by end-2021.

Lead: HSE

Irish Cancer Screening Programme

2017-2026

What about the rest of Europe?

Home > Applied Health Economics and Health Policy > Article

A Systematic Review of Cost-Effectiveness **Analyses of Colorectal Cancer Screening in Europe: Have Studies Included Optimal Screening Intensities?**

Systematic Review | Open Access | Published: 28 June 2023 | 21, 701-717 (2023)



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Rajani Pokharel 🖾, Yi-Shu Lin, Ethna McFerran & James F. O'Mahony

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Babela 2021 -	◆
Currais 2021 -	◆
Coretti 2020 -	◆
Aeria 2019 -	◆
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FIT Cut-Off, µg Hb/g (log scale)

How long until you turn 45?

Take home

Ages 50–74 years was the most analysed range.

Only 7 (18%) included start ages below 50 and 12 (31%) analysed stop ages above 75 years.

However, starting and stopping between 45–50 and 74–80 years, respectively, was found to be optimal

FIT cut-off

Most simulation estimates indicate 10 µg Hb/g to be optimal, only Burgenland uses such a low threshold.

Germany and Lithuania both feature cut-offs as low as 4 µg Hb/g, but not programme wide.

All Dutch CEA estimates report 20 μg Hb/g or lower to be optimal but the Dutch programme uses a higher cut-off of 47 μg Hb/g. Many European CEAs of CRC screening have not included a sufficient range of screening strategies in their analyses Implying that current European CRC screening is likely of suboptimal intensity and that many more lives could be saved if programmes could offer annual screening.

Challenges

- Restricted capacity for colonoscopy
 - Diagnostic red flag targets/ waitlists / cleaning times increased
- Transition to FIT in screening program (NI)
- Long term vision to expand age range of access to screening
- FIT triage in primary care
- Making best use of resources
- Planning tools & the vision for Encompass (NI new multi-potential IT system)
- Managing change



Route of diagnosis matters to survival

*inc. Stage at diagnosis

Table 9: Three-year net survival (ns, %) of colorectal cancer patients diagnosed in Northern Ireland (2012-2016) and England (2011-2015), by route-to-diagnosis

Route-to-diagnosis	Northern	n Ireland	Eng	land
	n*	ns, %	n	ns, %
Screen	490	94.1	16,331	93.1
Red Flag	1,560	71.9	50,663	<mark>6</mark> 9.3
GP Referral	1,207	70.8	38,797	67.8
Outpatient	766	71.2	10,573	<mark>63.3</mark>
Inpatient	419	69.7	5,398	71.2
Emergency Presentation	1,249	37.9	38,936	35.4
*some patients/cases are not techniques	included in the	e survival anal	ysis, see 1.6	Analytical



Colorectal Cancer Triage, Diagnosis, Management & Survival

Economics Modelling, System Dynamics & Prevention in Colorectal Cancer



Early information on COVID impact

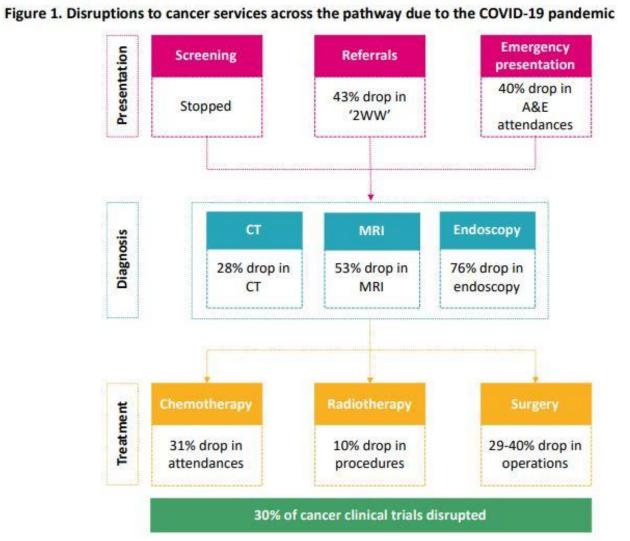


 Table 1
 Average reduction in 10-year net CRC survival by age and stage consequent from per-patient delay of 2/4/6 months in the diagnostic pathway (assuming no prioritisation based on FIT)

		Average per-patient delay in diagnosis Average reduction in 10-year net survival				
Age band	CRC stage	2 months	4 months	6 months		
30–39 years	Stage 1	0.4%	1.1%	1.9%		
	Stage 2	5.1%	11.7%	20.1%		
	Stage 3	9.1%	20.0%	32.2%		
40-49 years	Stage 1	1.6%	3.9%	7.0%		
	Stage 2	5.2%	12.0%	20.7%		
	Stage 3	9.7%	21.1%	33.5%		
50-59 years	Stage 1	1.7%	4.1%	7.5%		
	Stage 2	4.9%	11.3%	19.5%		
	Stage 3	9.3%	20.5%	32.8%		
60-69 years	Stage 1	1.7%	4.3%	8.0%		
	Stage 2	5.3%	12.4%	21.4%		
	Stage 3	9.5%	20.8%	33.1%		
70-79 years	Stage 1	2.7%	6.8%	12.5%		
	Stage 2	6.5%	15.0%	25.5%		
	Stage 3	11.0%	23.2%	35,0%		
80+ years	Stage 1	7.5%	17.2%	28.7%		
	Stage 2	8.2%	18.5%	30.4%		
	Stage 3	11.5%	22.0%	29.7%		

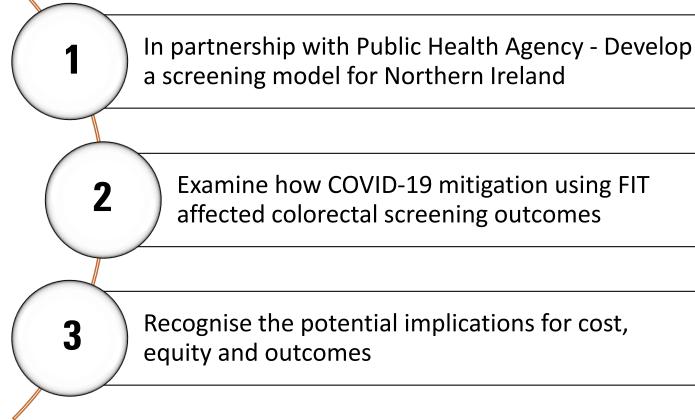
Red shading indicates greater impact on survival; blue shading indicates lesser impact on survival.

https://www.carnallfarrar.com/media/1570/200813-recovering-cancer-from-coviddocx.pdf

Vision

- Building upon the expertise of international modelling consortia collaborators develop a real time CRC model
 - Fully user led development
 - Connected data streams
 - User led output specifications
 - Policy based, future enabled
 - Predict cost and benefits for service design
 - Tackle inequity & enable personalisation
 - Contribute to national and international publications (eg PCCRC)

Aims and **Objectives**



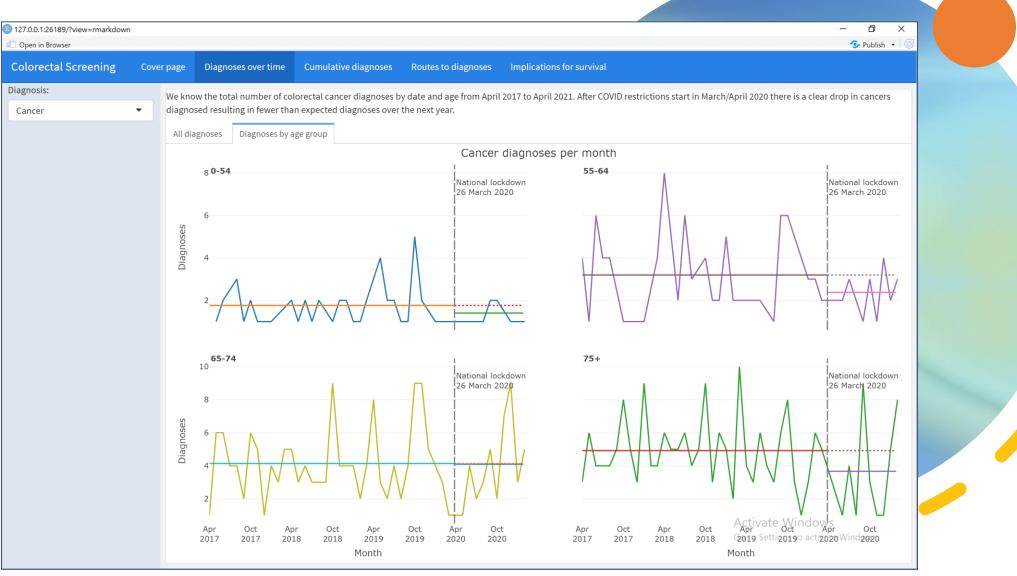
In partnership with Public Health Agency - Develop

Platform design to integrate meaningful data

- Dashboard
- Designed in R
- Embedded text mining pilot code for conversion rates (based on clinical colonoscopy audit feed)
- Loops to create clinical rate of likely 'Missed' cancer number info feeds
- Survival by route to diagnosis embedded
- 'Sliders' which modify survival by route
- Demand/ supply capacity 'temperature' changes

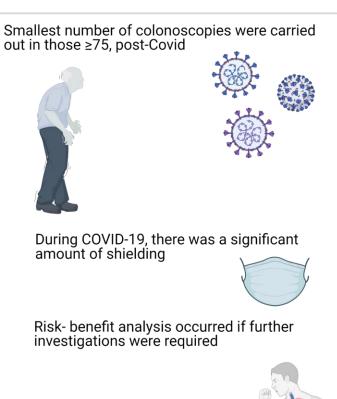


So far



Interim findings

Further impact of COVID-19 on Colonoscopies Conducted



Impact Upon Patients, Policymakers, and Service Providers

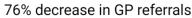
Patients may now be provided with a stool test, where previously a colonoscopy may have been performed



Service providers will now have to carry out a greater level of decontaminations, possibly resulting in fewer colonoscopies overall



For policymakers, it is important to understand how many procedures related to given referral criteria result in a cancer diagnosis



So far

Major Findings:

1. Increased cancer conversion rate expected in the post-Covid symptomatic FIT triage system

2. Proportion of negative colonoscopies is lower – opens the potential to expand screening offerings

At what cost does an early indication of savings from FIT triage come?

- Benefits of conversion rate changes needs to balanced against relative differences in presentations,
- Multi-year impact of potentially missed cancers and changes in polyps detected during a period of failures to present and COVID reduced services.

Work on-going



Honest Broker Request for full NI dataset in draft

Matched FIT and colonoscopy – conversion rates

Grant submission



- Screening focus

- Imputation of survival for historical controls (restricted release cases)

- Actively partnering with PHA / Cancer Registry to examine post COVID survival rates

- Collaboration with Trinity College Dublin / Erasmus MC Rotterdam for calibration analysis

Acknowledgements

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 - Health Data Research UK
 - Economic & Social Research Council
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- Dr F Lamrock
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- HSC Trust Information Governance teams
- Public Health Agency NI (Dr Christine McKee)
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