WEO

The voice of world endoscopy

Colonoscopy Prioritization

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Statement- No disclosures

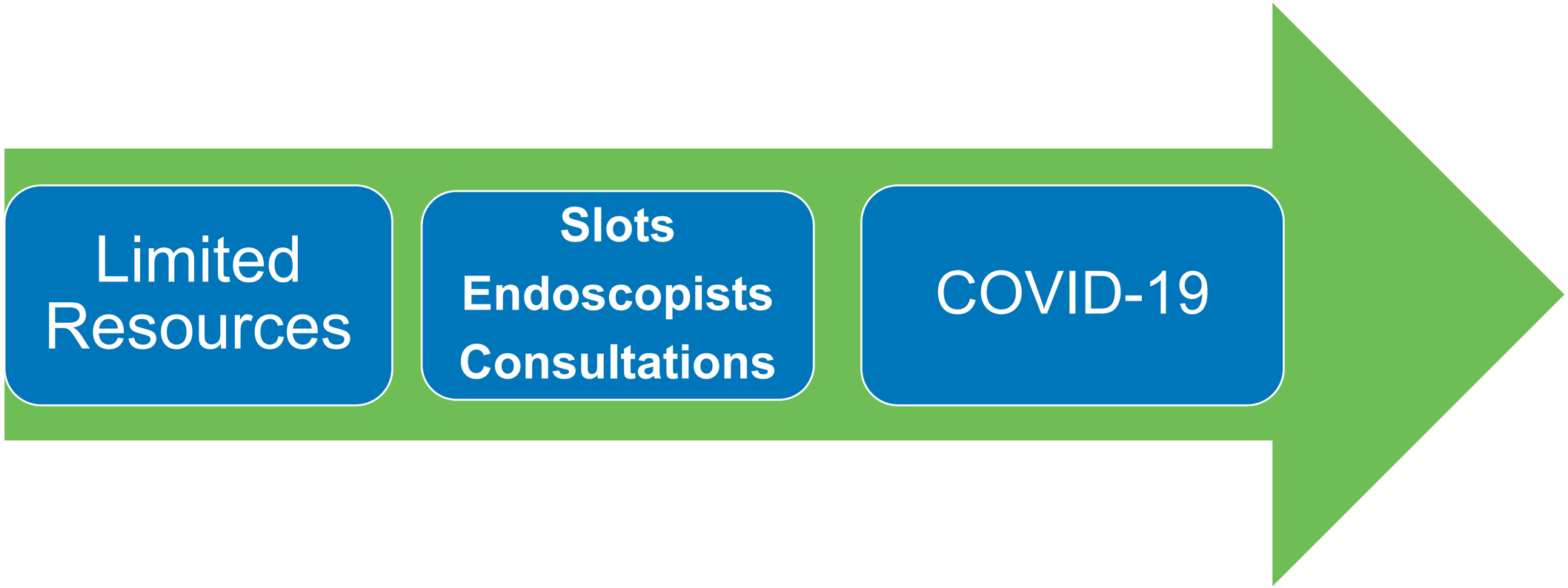
Relevance/Rationale: Colonoscopy Uptake Increases Worldwide

- Increased awareness for CRC screening and high risk populations
- Younger screening onset
- Wider availability
- Better tolerance

Real-World National Colonoscopy Volume in Korea: A Nationwide Population-Based Study over 12 Years

Jae Myung Cha[1], Min Seob Kwak[1], Hyun-Soo Kim[2], Su Young Kim[2], Sohee Park[3], Geun U Park[4], Jung Kuk Lee[5], Soo Jin Kim[6], Hun Hee Lee[6], Joo Sung Kim[7], and Won Ho Kim[8], for the Big Data Research Group of the Korean Society of Gastroenterology

Gut and Liver, Vol. 14, No. 3, May 2020, pp. 338-346


Limited Resources
Slots
Endoscopists
Consultations
COVID-19

The Pandemic highlighted the Need For Prioritization

Effect of delays in the 2-week-wait cancer referral pathway during the COVID-19 pandemic on cancer survival in the UK: a modelling study

Amit Sud, Bethany Torr*, Michael E Jones, John Broggio, Stephen Scott, Chey Loveday, Alice Garrett, Firza Gronthoud, David L Nicol, Shaman Jhanji, Stephen A Boyce, Matthew Williams, Elio Riboli, David C Muller, Emma Kipps, James Larkin, Neal Navani, Charles Swanton, Georgios Lyratzopoulos, Ethna McFerran, Mark Lawler, Richard Houlston, Clare Turnbull*

Lancet Oncol 2020; 21: 1035–44

Interpretation Prompt provision of additional capacity to address the backlog of diagnostics will minimise deaths as a result of diagnostic delays that could add to those predicted due to expected presentational delays. Prioritisation of patient groups for whom delay would result in most life-years lost warrants consideration as an option for mitigating the aggregate burden of mortality in patients with cancer.

Prioritisation by FIT to mitigate the impact of delays in the 2-week wait colorectal cancer referral pathway during the COVID-19 pandemic: a UK modelling study

Gut 2021;**70**:1053–1060.

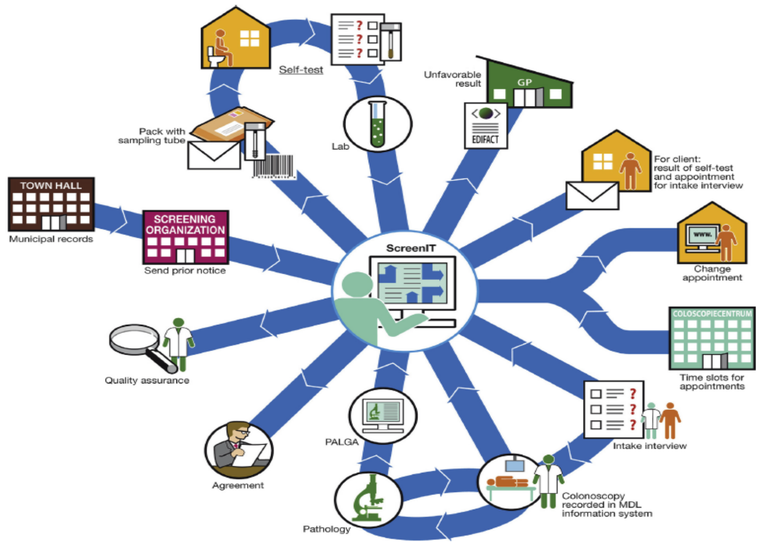
FIT based prioritization modelling

FIT threshold adjustment

Real-Time Monitoring of Results During First Year of Dutch Colorectal Cancer Screening Program and Optimization by Altering Fecal Immunochemical Test Cut-Off Levels

Esther Toes-Zoutendijk,[1] Monique E. van Leerdam,[2] Evelien Dekker,[3] Frank van Hees,[1] Corine Penning,[1] Iris Nagtegaal,[4] Miriam P. van der Meulen,[1] Anneke J. van Vuuren,[5] Ernst J. Kuipers,[5] Johannes M. G. Bonfrer,[6] Katharina Biermann,[7] Maarten G. J. Thomeer Harriët van Veldhuizen,[9] Sonja Kroep,[1] Marjolein van Ballegooijen,[1] Gerrit A. Meijer,[10] Harry J. de Koning,[1] Manon C. W. Spaander,[5] and Iris Lansdorp-Vogelaar,[1] on behalf of t Dutch National Colorectal Cancer Screening Working Group

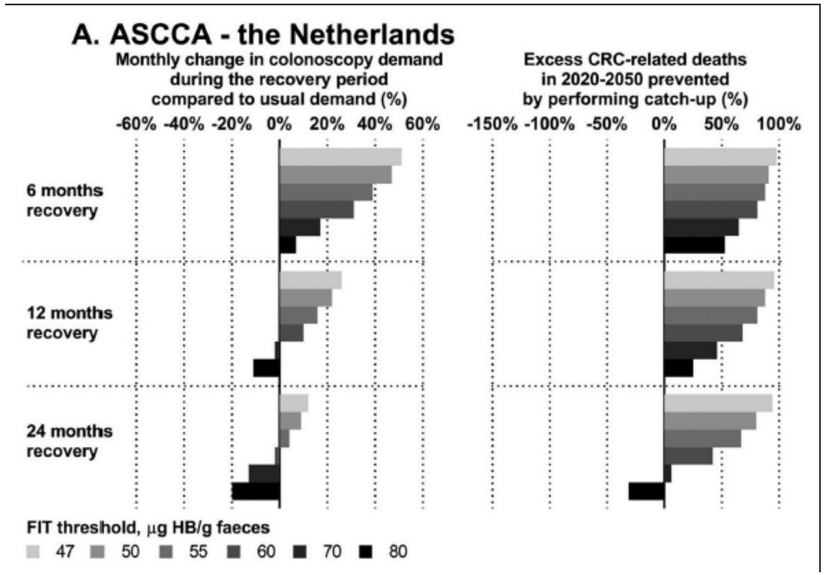
Gastroenterology 2017;152:767–775



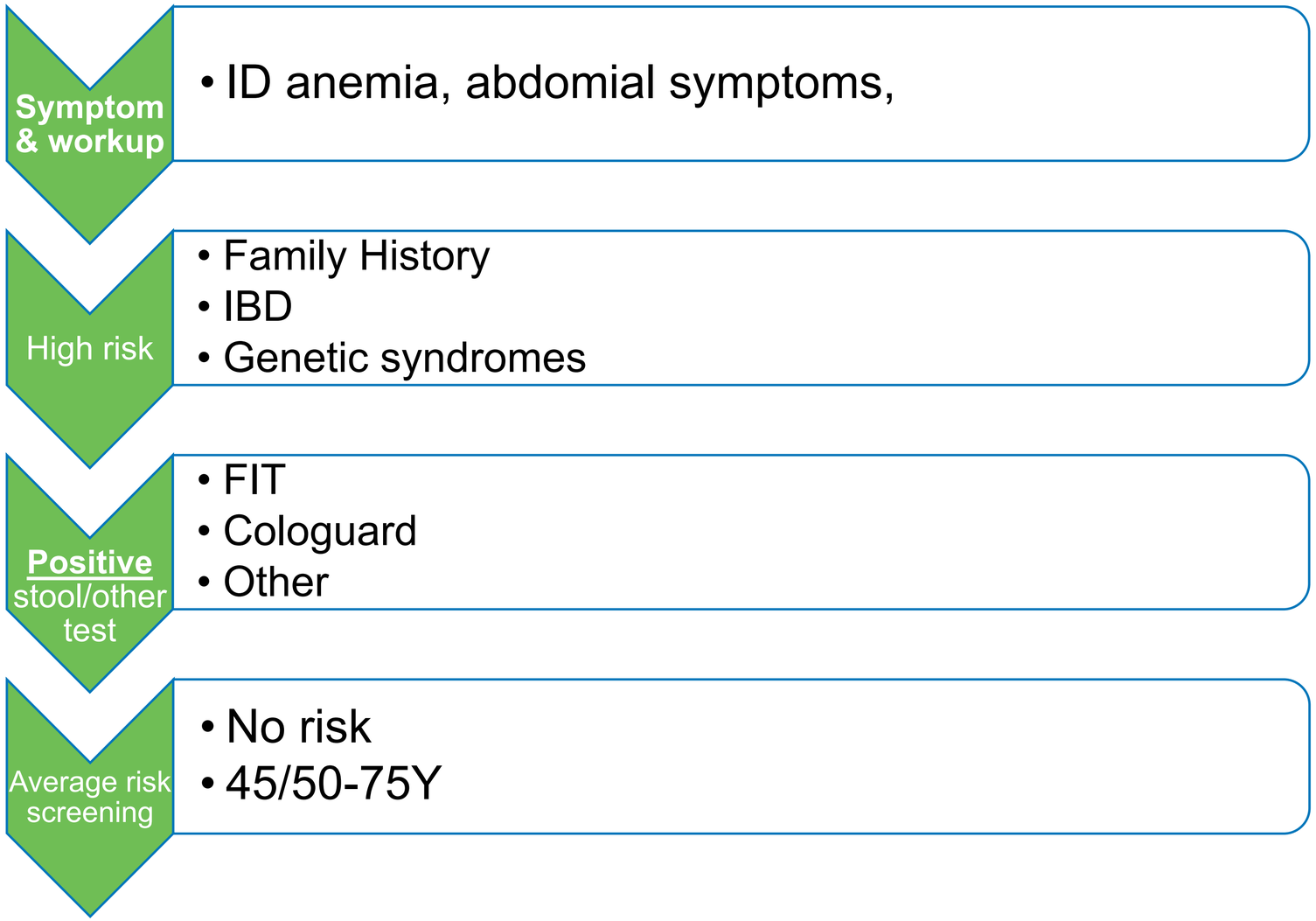
Prioritisation of colonoscopy services in colorectal cancer screening programmes to minimise impact of COVID-19 pandemic on predicted cancer burden: A comparative modelling study

J Med Screen
2022, Vol. 29(2) 72–83

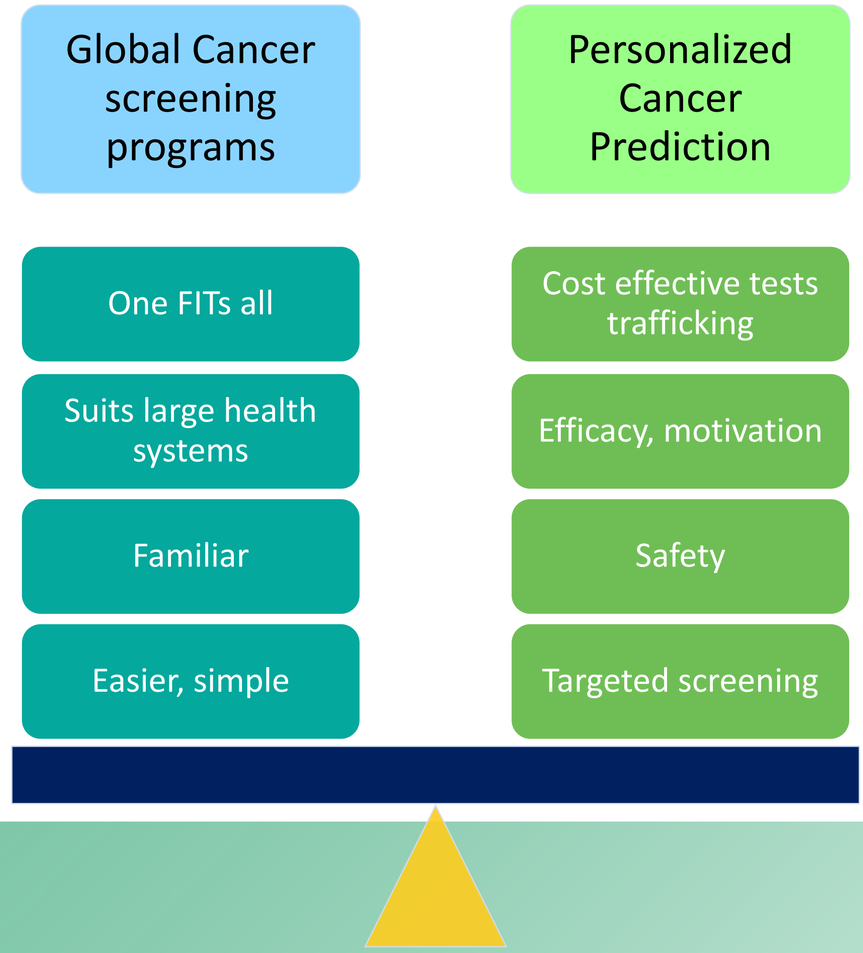
Cancer Global Modelling Consortium (CCGMC) working group



Populations for Colonoscopy Uptake



Does One FITs all?



Literature Review- FIT, ColonFlag

The Value of Quantitative Faecal Immunochemical Testing as a Prioritisation Tool for the Endoscopic Investigation of Patients With Iron Deficiency

*William Clackett, Stephen T. Barclay, Adrian J. Stanley and Aidan Cahill**

ORIGINAL RESEARCH
published: 22 July 2021

Priority stratification for colonoscopy based on two-sample faecal immunochemical test screening: results from a cross-sectional study at an endoscopy clinic in Japan

Toyoshima O, *et al*. *BMJ Open* 2021;**11**:e046055.

bjh research paper

Potential roles of artificial intelligence learning and faecal immunochemical testing for prioritisation of colonoscopy in anaemia

British Journal of Haematology, 2019, **185,** 311–316

Risk Prediction Scores

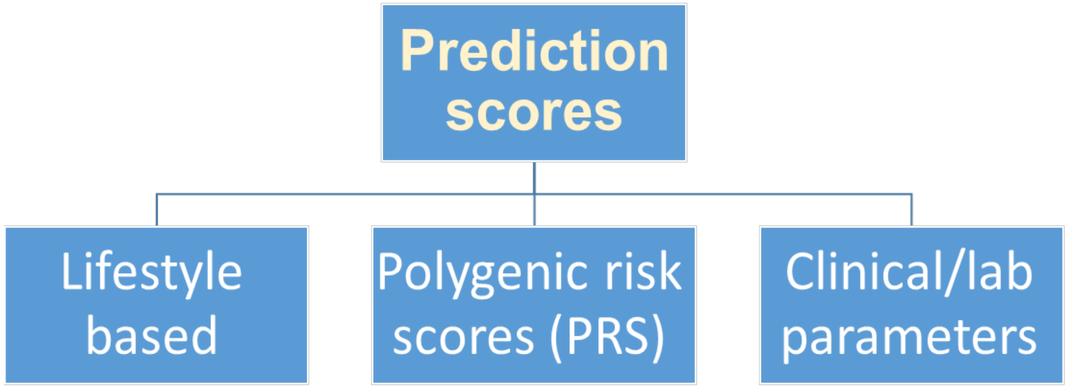
ORIGINAL ARTICLE

Comparison of prognostic models to predict the occurrence of colorectal cancer in asymptomatic individuals: a systematic literature review and external validation in the EPIC and UK Biobank prospective cohort studies

Smith T, *et al*. *Gut* 2019;

The C-statistics of the models were largely similar between validation cohorts with the highest values achieved being 0.70 (95% CI 0.68 to 0.72) in the UK Biobank and 0.71 (95% CI 0.67 to 0.74) in EPIC.

			Demographic characteristics				Anthropometry		Family history of Cancer	Medical history				Medication use			Lifestyle factors			Diet		
Author	Sex	Outcome	Sex	Age	Eth	Edu	Height	BMI		Diabetes	Screen/endo/ polyp	IBD	Menopausal status	HRT	OC	NSAID	Physical activity	Smoking	Alcohol	Red meat/ meat	Veg	Vit
Colditz[23]	M	C		●			●	●	●		●	●				●	●		●	●	●	●
	F	C		●			●	●	●		●	●		●	●	●	●		●	●	●	●
Driver[24]	M	CRC		●				●										●	●			
Freedman[7]	M	CRC		●				●	●		●					●	●	●			●	
	F	CRC		●				●	●		●		○ α	○ α		●	●				●	
Ma[9]	M	CRC		●				●									●	●	●			
	M	C		●				●									●	●	●			
	M	R		●													●		●			
Shin[25]	M	R C		●				●	●										●	●		
	F	R		●			●												●	●		
Steffen[30]	Both	CRC	●	●				●		●	●							●	●			
	Both	C	●	●				●		●	●							●	●			
	Both	R	●	●				●		●	●							●	●			
Taylor[8]	Both	CRC		●					●													
Wells[26]	M	CRC		●	●	●		●	●	●						●	●	●	●	●		●
	F	CRC		●	●	●		●	●	●				○ μ	○ μ	●		●	●			●
Variable availability in EPIC			■	■		□	■	■	□	■	□		na	□	□	□	■	■	■	□	□	□
Variable availability in UK Biobank			■	■	■	□	■	■	□	■	■	■	na	□	□	□	□	■	■	□	□	■



Sassano *et al. BMC Cancer* (2022) 22:65
https://doi.org/10.1186/s12885-021-09143-2

BMC Cancer

RESEARCH Open Access

Polygenic risk prediction models for colorectal cancer: a systematic review

Michele Sassano[1†], Marco Mariani[1†], Gianluigi Quaranta[1,2], Roberta Pastorino[2*] and Stefania Boccia[1,2]

Colonoscopy Prioritization Considerations

Tool	Performance	
	Threshold	
	Parameters	Adjusting for screen benefit- Age, BG

Implementation

- Target Population
- Upon referral/Initiated
- Recommendations for clinicians
- Workflow

MHS Initiative for Prioritizati

- MHS- 2nd largest HMO in Israel, 2.5 millio
- National screening program includ ows colonoscopy for average risk
- **MHS screening sta**

  •68.4% are % FIT, 47% performed colonos

  d for the unscrened upon CBC uptake

Colonoscopy Volume is to be Limited

ColonFlag – Machine Learning Risk Model for CRC

Flag individuals not up-to-date with Colorectal Cancer (CRC) screening guidelines at high risk of harboring Colorectal Cancer using only complete blood count (CBC) test results, age and sex.

Conventional
CBC results
+ Age
+ Sex

ColonFlag
Computational Model

Risk
for Colorectal cancer

− Follow Guidelines

\+ Above Cut-Off → Expedited Evaluation

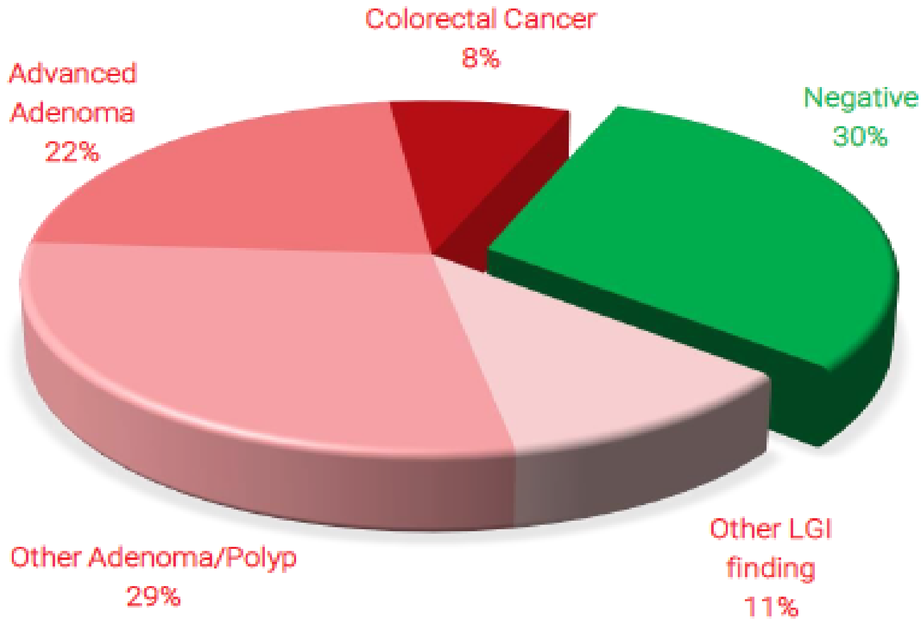
Well validated: 5 Retrospective Peer Reviewed Validation Studies
2 Peer Reviewed Real Use Observational Studies

Medial EarlySign

British Journal of Cancer (2017) 116, 944–950 |
PLOS ONE | February 9, 2017
Clin Cancer Inform. © 2018 by American Society of Clinical Oncology

Real World Evidence, Geisinger(*)

- 25,610 patients not-complying with screening, with CBC taken during study period(**) were analyzed
- Out of these, 706 patients were flagged (2.8%), an average of 11.2 patients per week
- Flagged patient list weekly transferred to care management
- 68.1% of flagged patients were subsequentially scheduled for colonoscopies
- Of these flagged patients who underwent colonoscopy,
  - Approximately 70% had a significant finding
  - 8% PPV for CRC (1:12)
  - 51% detected with Adenoma / Polyp (1:2)

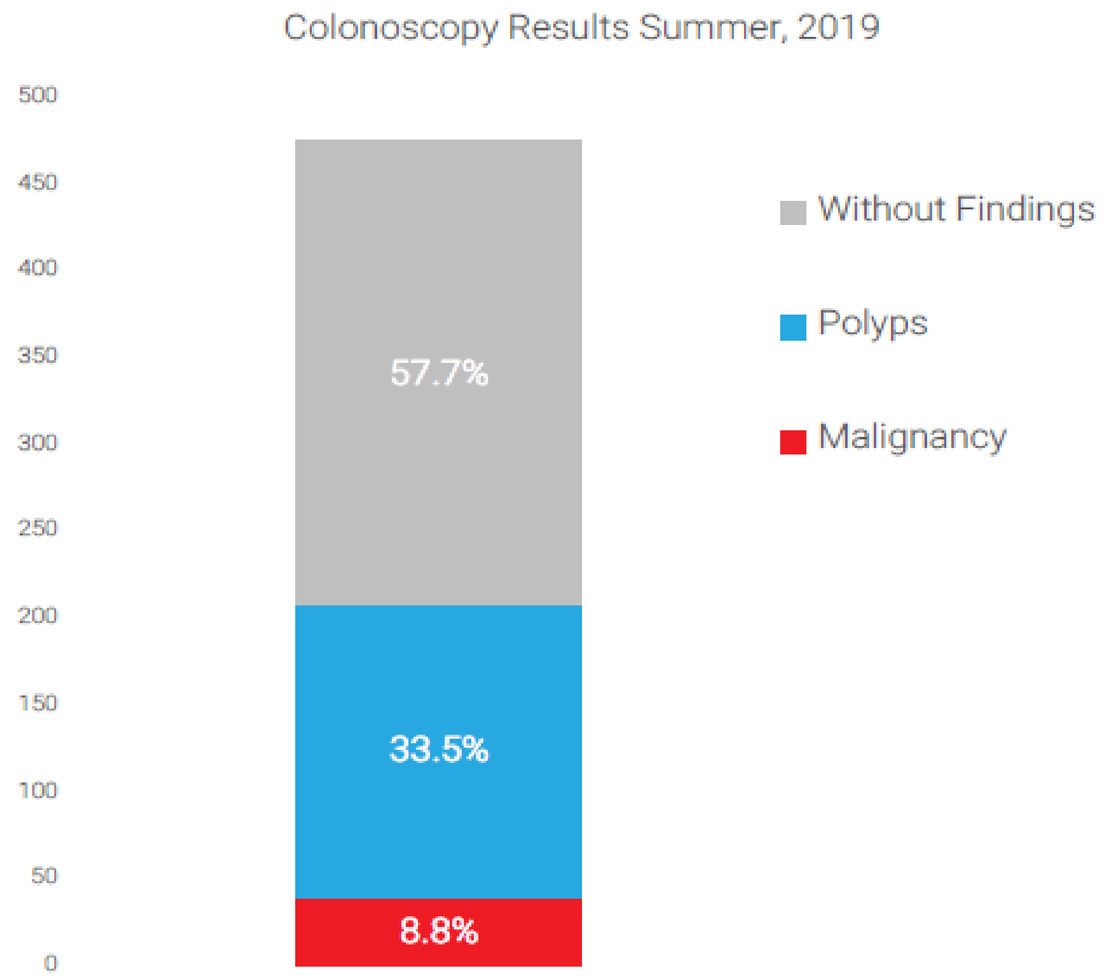


Colonoscopy Results, LGI-Flagged Patients, Geisinger


Collaboration to Improve Colorectal Cancer Screening Using Machine Learning

(*) Published in: Collaboration to Improve Colorectal Cancer Screening using Machine Learning, *NEJM Catalyst Innovations in Care Delivery: Vol. 3 Issue 4 | April 2022* (link)
(**) LGI-Flag installed on site, results during a 63-week period (May 14, 2019 - July 28, 2020)

Maccabi – Actual Results as of Summer, 2019 (4 years usage)

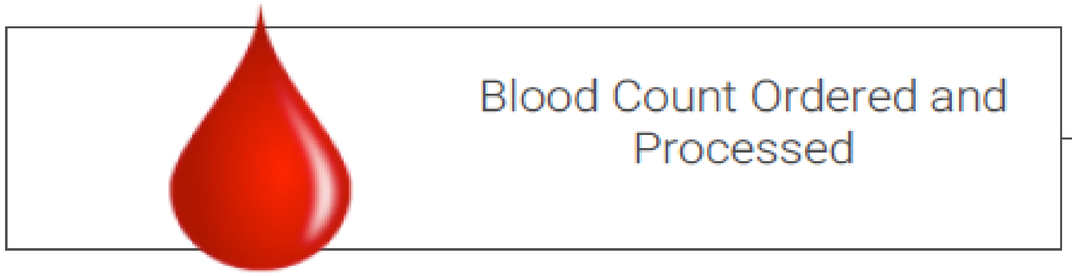


Results

- >8.8% PPV for Malignancies
- 33.5% for Polyps (11% high risk adenomas)
- Any kind of findings >42%
- <1% increase in colonoscopies
- Increased compliance to colonoscopy
- More than 70 ColonFlag associated cancer cases detected

Medial EarlySign

Workflow – Maccabi Workflow



Blood Count Ordered and Processed

Age 50-75 ?

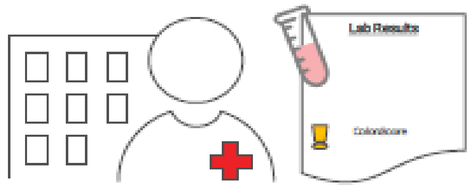
Yes

Screening Up-To Date ?

No

Additional Exclusions* ?

No



"Algo Marker"
Part of the Labs Results

Yes

Above Cut-Off ?

Calculate ColonFlag

Point of Care Alert
Flag GP on EMR

No

Follow Guidelines

MOH Award on AI Implementation

BEST PRACTICES AWARDS 2017

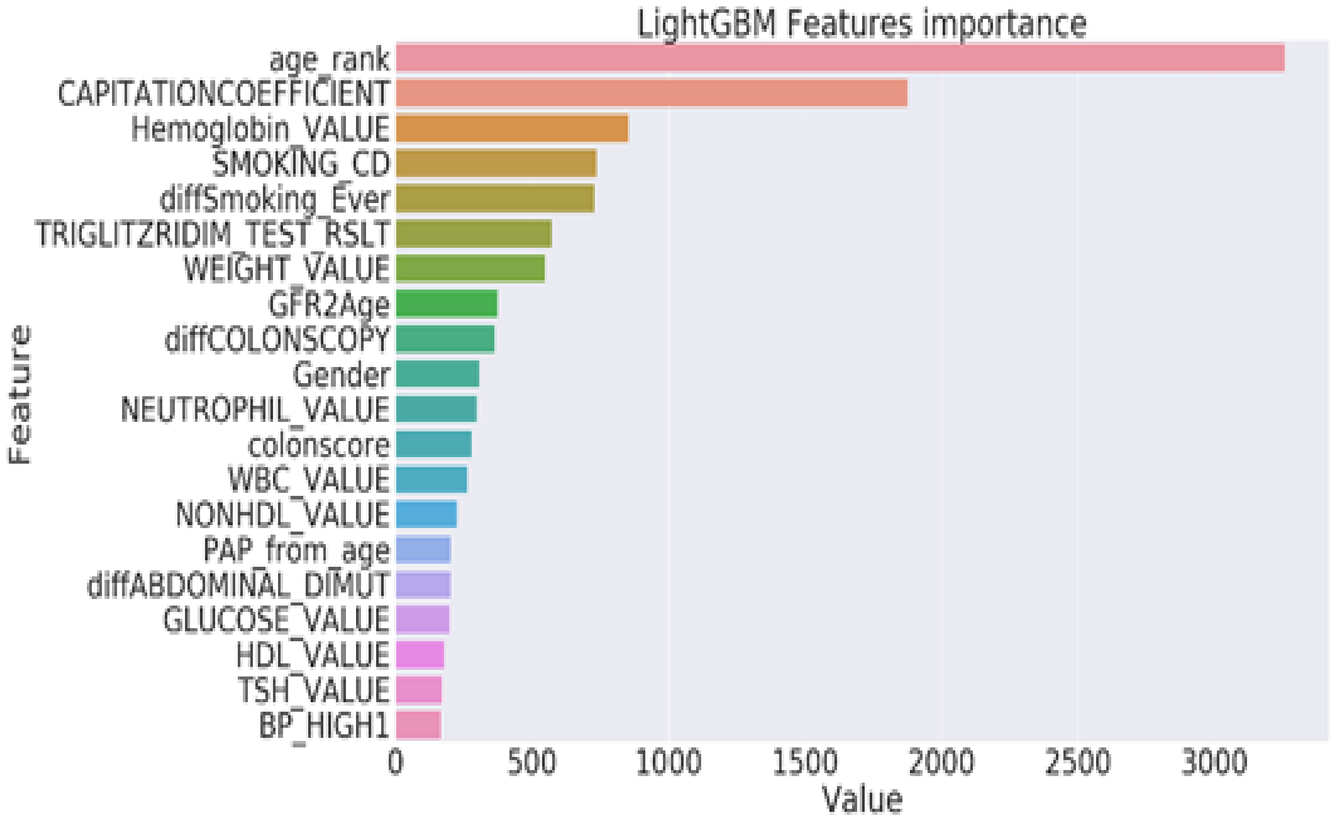
Medial EarlySign

* - e.g. – under GI examination, Frail, After Bariatric Surgery, etc...

MHS Polyp Prediction Tool

- **Information Extraction**:
  - Age≥45Y,
  - Colonoscopy reports free text (indication, findings)
  - Pathology reports free text
  - EMR- MHS database (diagnosis, lab)
  - MHS Family tree tool

- 28,130 colonoscopies
- AUC-0.66>> 0.75



מכבי
אגף מערכות מידע
תחום דאטה ואנליטיקה

Initial Implementation

Population

- **<u>Average risk</u>**
- No symptoms or major risk factors, no previous polyp/cancer, no FIT+
- GP or self referred for colonoscopy
- No colonoscopy within 5-10Y

Dry run

- Colonflag
- Polyp Prediction tool

Analysis

- Threshold definition
- Recommend ation to physicians
- Dedicated slots

Conclusions

- Colonoscopy is on the rise and in need worldwide
- Medical and economical management
- Prioritization may be cardinal to prevent CRC related death
- Existing and novel prioritization tools should be explored along with sound, gradual implementation

THANKS

- **MHS +Maccabitech**

  Roni Romano

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WEO
World Endoscopy Organization