Population-level insights into colorectal cancer screening in a claims-based analysis of 46M insured individuals: insights into colorectal cancer screening and its follow-up

Alyssa Goodson,[1] Haley McCracken,[1,a] Jacob Lippa,[1] Nithya Venkatamohan[1]

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[a]*Current affiliation: Verantos, Menlo Park, CA, USA*

INTRODUCTION

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- A significant challenge in the implementation of population-wide cancer screening programs, such as those for colorectal cancer (CRC), is that individuals are often left behind (never screened) or do not receive recommended follow-up care,[1-3] even those individuals assessed as at a higher risk for CRC
- Tracking and monitoring screening care gaps and identifying areas for improvement, while challenging at the healthcare system level, becomes even more complex at the population level; however, analysis at the population level is crucial if large-scale changes in screening program implementation are required[4]
- Leveraging population-scale healthcare datasets offers the opportunity to better understand adherence to guideline-recommended screenings and identify opportunities for improvement in screening programs[5]

OBJECTIVE

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- Here we describe an analysis of a healthcare claims dataset to assess care gaps and areas of potential improvement in CRC screening at the US population level

METHODS

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Study design

- A dataset of individuals (n=5,443,214) aged 50–75 years with claims between 2013 and 2020 was identified from a US healthcare claims database (Optum MarketClarity) that included approximately 46 million individuals
- The dataset was analyzed according to three key prevention and screening dimensions:

1. Documentation indicating known personal and family CRC risk factors

- Assessment of individuals in the dataset as high vs average risk for CRC was based on the CRC risk factors determined by the American Cancer Society[6]
  - This list included standard codes for personal and family history of colorectal polyps or CRC, inflammatory bowel diseases, as well as certain diagnosed hereditary syndromes such as Lynch Syndrome
  - Clinical informaticists categorized and annotated 138 diagnosis and family history codes related to the list from standard vocabularies

2. Screening assessment modality

- Screening adherence was assessed using the claims history of average-risk individuals aged 50-75 years
- A list of 261 CPT (Current Procedural Terminology), HCPCS (Healthcare Common Procedure Coding System), SNOMED (Systemized Nomenclature of Medicine), and ICD (International Classification of Diseases) -9/10 codes curated and annotated by clinical informaticists trained to identify screening procedures was utilized to determine the following:
  - Type of CRC screening procedure used
  - Average age (years) at the time of first CRC screening after reaching the recommended screening age (50) for average-risk individuals
    - These data predate the screening age being lowered to 45 years by the United States Preventive Services Taskforce in 2021
  - Distribution of time interval between age 50 years and first screening to assess potential differences by screening modality
  - Screening modalities by type and per age group were assessed for claims from 2014–2019; determination of risk, recording of family history, and age at and time to first screening were assessed from 2013–2020

3. Follow-up after abnormal screening in average-risk individuals

- Time to follow-up colonoscopy in the event of an abnormal screening with a stool-based test was assessed

KEY FINDINGS AND CONCLUSIONS

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- Improvements to coding of claims data relating to CRC can aid in the identification of individuals requiring screening or follow-up interventions at a larger scale than currently possible
- Our analysis of CRC screenings in a claims dataset of 46 million individuals found that in those with available stool test results, more than 50% of individuals with an abnormal stool-based screening did not have a follow-up colonoscopy within 1 year
- There is a marked opportunity to implement programs and tools to ensure timely follow up after abnormal findings on CRC screening tests
- These results warrant further exploration and validation in a similar dataset coupled with complete stool-based test results

RESULTS

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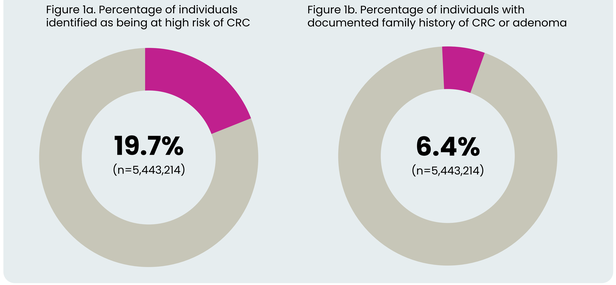
- Analysis of documentation indicating known personal and family CRC risk factors
  - In this dataset approximately one in five individuals had ≥1 code documented as being high risk for CRC (**Figure 1a**)
  - Approximately 350,000 individuals had a documented family history of CRC or adenoma (**Figure 1b**)

Figure 1. Documentation of CRC risk and family history

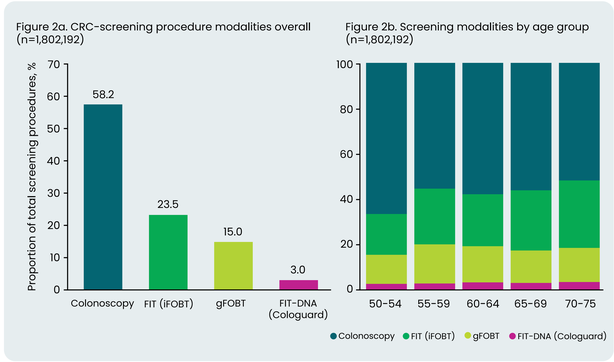


CRC, colorectal cancer.

Analysis of screening modality

- Colonoscopy was the dominant (58.2%) screening modality; stool-based tests accounted for 41.5% of screenings procedures (**Figure 2a**)
- The use of stool-based tests increased with age (**Figure 2b**)

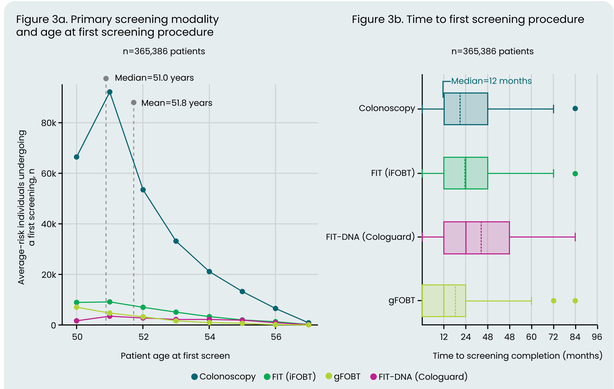
Figure 2. Screening modality used in the average-risk population



CRC, colorectal cancer; FIT, fecal immunochemical test; FOBT, fecal occult blood test; gFOBT, guaiac FOBT; iFOBT, immunochemical fecal occult blood test.

- For average-risk individuals aged 50–59 years undergoing a first screening (n=365,386), the primary screening modality was colonoscopy (**Figure 3a**), and the median time to receive a first screening colonoscopy was 12 months (**Figure 3b**)
- The median age at first screening by colonoscopy or stool-based tests was 51.0 years

Figure 3. Timeline and modality for first screening procedures in average-risk individuals aged 50-59 years



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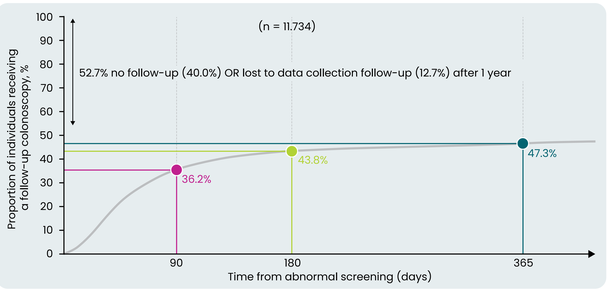
- Analysis of follow-up after abnormal screening in an average-risk population
  - Of the individuals (n=11,734) who had an interpretable abnormal stool screening test result, 47.3% received a follow-up colonoscopy within 1 year of the stool test, 36.2% completed the procedure within 90 days, and 43.8% received a colonoscopy by 180 days (**Figure 4**)

Figure 4. Cumulative time to follow-up colonoscopy after abnormal stool-based screening



LIMITATIONS

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- Claims data are easy to access but can be hard to interpret at scale
  - Some pertinent data are not included in claims databases, such as pathology reports
  - Other data are recorded inconsistently, for example positive stool results and family history of CRC, as suggested by the low proportions of individuals with these data presented here
  - Future generation and use of CRC-specific codes could allow for more consistent documentation of information related to CRC screening adherence and follow-up
- The time period covered by this analysis (2013–2020) limits the understanding of the effect of mitochondrial DNA testing, which was launched and widely available in 2016, as well as the more recent strain that COVID-19 put on health services
- Given that our analysis covered a pre-COVID-19 time period, a follow-up analysis of more recent screening adherence should be performed in a future analysis using more recent data
- Since very few stool test laboratory results were available and interpretable from free-text data in the claims dataset utilized, full assessment of time to colonoscopy post-positive stool from the >650,000 stool tests in our population was challenging
- Furthermore, some stool-based testing, particularly Cologuard, may not be captured in claims data

References

1. Smith RA, et al. *CA Cancer J Clin*. 2019;69(3):184-210.
2. Barlow W, et al. *J Natl Cancer Inst*. 2020;112(3):238-246.
3. Siegel RL, et al. *CA Cancer J Clin*. 2023;73(3):233-254.
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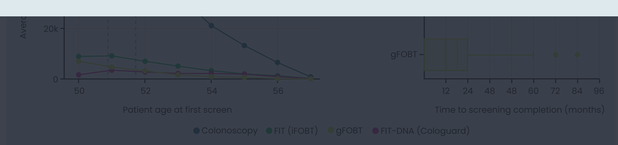

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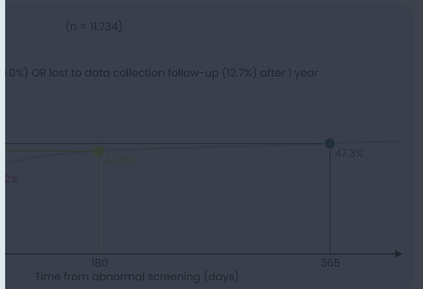

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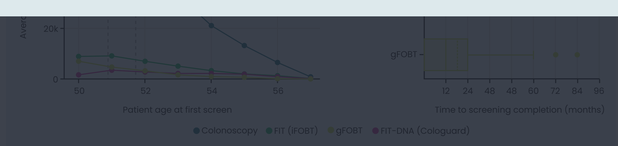

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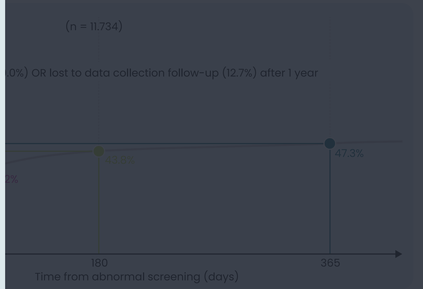

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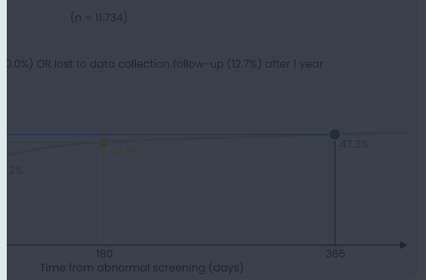

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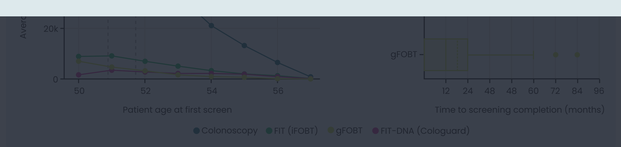

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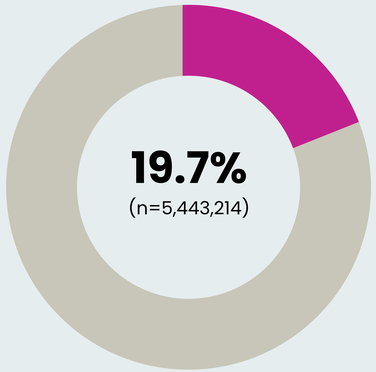
Figure 1. Documentation of CRC risk and family history

Figure 1a. Percentage of individuals identified as being at high risk of CRC



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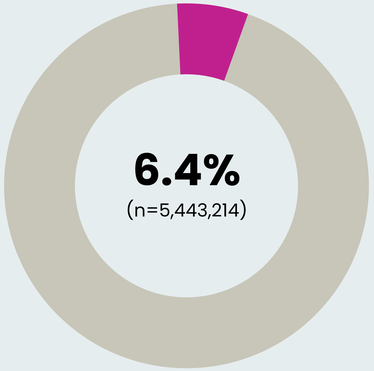

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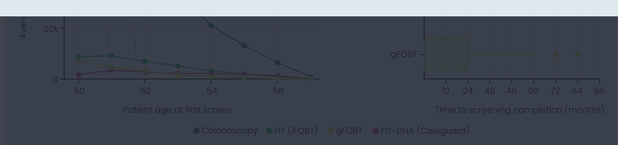

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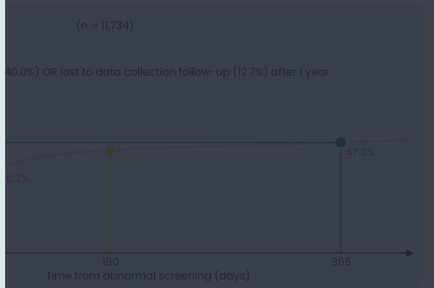

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Poster Sa1101. Presented at Digestive Disease Week; May 18–21, 2024; Washington, DC, USA.

Population-level insights into colorectal cancer screening in a claims-based analysis of 46M insured individuals: insights into colorectal cancer screening and its follow-up

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INTRODUCTION

- A significant challenge in the implementation of pop
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- A dataset of individuals (n=5,443,214) aged 50–75 y
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- Improvements to coding of claims data relating to
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Alive

20k

0

50 52 54 56

Patient age at first screen

gFOBT

12 24 48 48 60 72 84 96

Time to screening completion (months)

Colonoscopy FIT (iFOBT) gFOBT FIT-DNA (Cologuard)

CRC, colorectal cancer; FIT, fecal immunochemical test; FOBT, fecal occult blood test; gFOBT, guaiac FOBT; iFOBT, immunochemical fecal occult blood test.

Back

RESULTS

Analysis of screening modality

- Colonoscopy was the dominant (58.2%) screening modality; stool-based tests accounted for 41.5% of screenings procedures **(Figure 2a)**
- The use of stool-based tests increased with age **(Figure 2b)**

Figure 2. Screening modality used in the average-risk population

Figure 2a. CRC-screening procedure modalities overall (n=1,802,192)

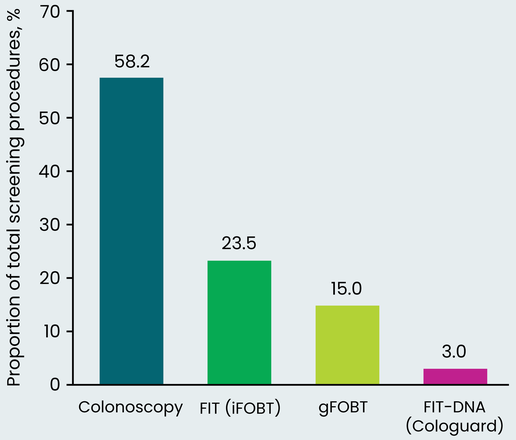
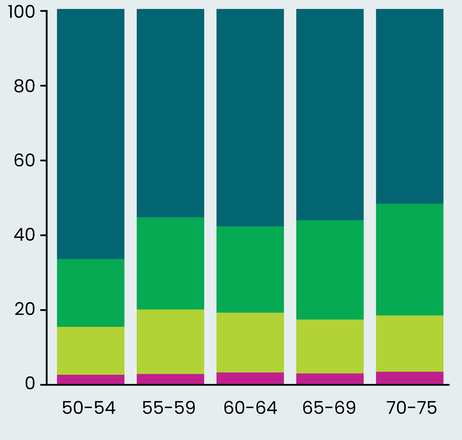


Figure 2b. Screening modalities by age group (n=1,802,192)



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2 of 4

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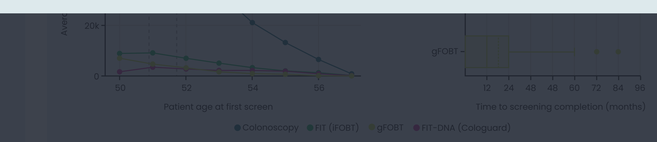

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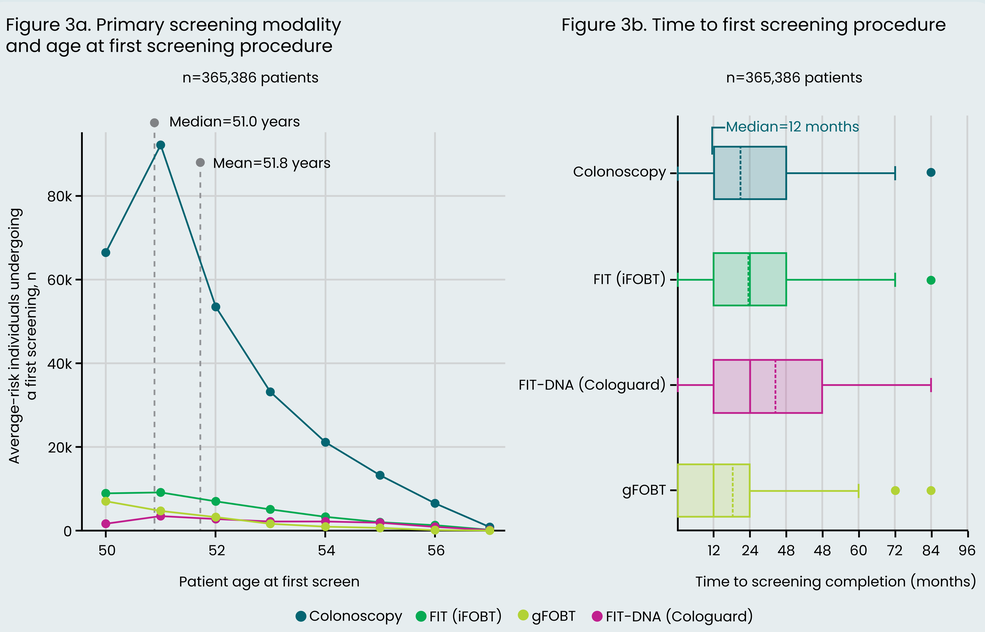
Back

RESULTS

- For average-risk individuals aged 50–59 years undergoing a first screening (n=365,386), the primary screening modality was colonoscopy (**Figure 3a**), and the median time to receive a first screening colonoscopy was 12 months (**Figure 3b**)
- The median age at first screening by colonoscopy or stool-based tests was 51.0 years

Figure 3. Timeline and modality for first screening procedures in average-risk individuals aged 50-59 years



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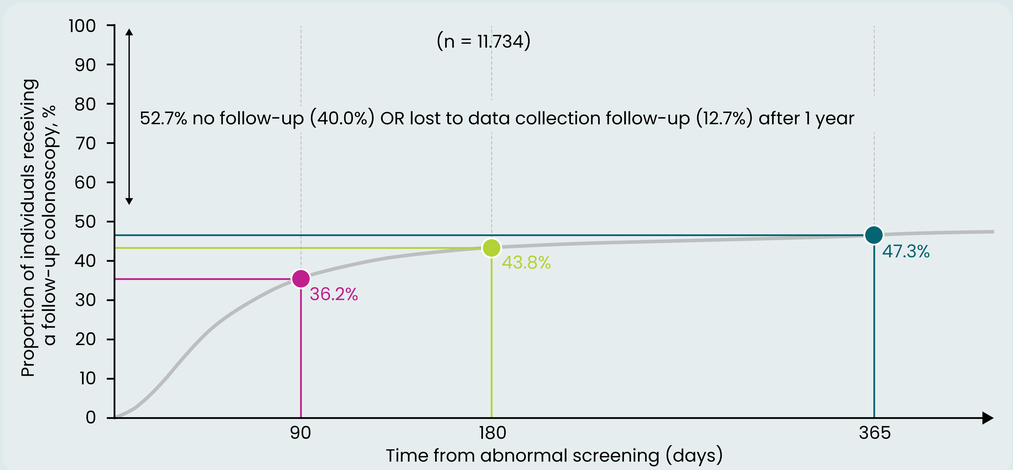
RESULTS

Back

- Analysis of follow-up after abnormal screening in an average-risk population
  - Of the individuals (n=11,734) who had an interpretable abnormal stool screening test result, 47.3% received a follow-up colonoscopy within 1 year of the stool test, 36.2% completed the procedure within 90 days, and 43.8% received a colonoscopy by 180 days (**Figure 4**)

Figure 4. Cumulative time to follow-up colonoscopy after abnormal stool-based screening



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LIMITATIONS

- Claims data are easy to access but can be hard to interpret at scale
  - Some pertinent data are not included in claims databases, such as pathology reports
  - Other data are recorded inconsistently, for example positive stool results and family history of CRC, as suggested by the low proportions of individuals with these data presented here
  - Future generation and use of CRC-specific codes could allow for more consistent documentation of information related to CRC screening adherence and follow-up
- The time period covered by this analysis (2013–2020) limits the understanding of the effect of mitochondrial DNA testing, which was launched and widely available in 2016, as well as the more recent strain that COVID-19 put on health services
- Given that our analysis covered a pre-COVID-19 time period, a follow-up analysis of more recent screening adherence should be performed in a future analysis using more recent data
- Since very few stool test laboratory results were available and interpretable from free-text data in the claims dataset utilized, full assessment of time to colonoscopy post-positive stool from the >650,000 stool tests in our population was challenging
- Furthermore, some stool-based testing, particularly Cologuard, may not be captured in claims data

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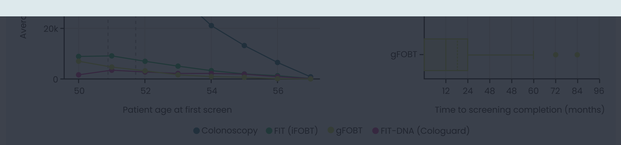

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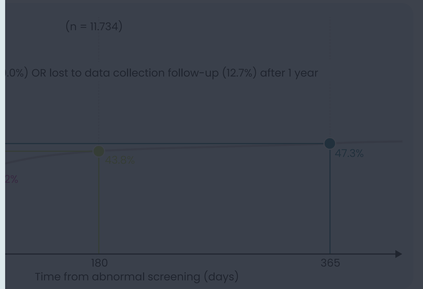

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- Improvements to coding of claims data relating to CRC can aid in the identification of individuals requiring screening or follow-up interventions at a larger scale than currently possible
- Our analysis of CRC screenings in a claims dataset of 46 million individuals found that in those with available stool test results, more than 50% of individuals with an abnormal stool-based screening did not have a follow-up colonoscopy within 1 year
- There is a marked opportunity to implement programs and tools to ensure timely follow up after abnormal findings on CRC screening tests
- These results warrant further exploration and validation in a similar dataset coupled with complete stool-based test results