

# Insurance Coverage for CT Colonography Screening: Impact on Overall Colorectal Cancer Screening Rates<sup>1</sup>

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## Purpose:

To compare overall colorectal cancer (CRC) screening rates for patients who were eligible and due for CRC screening and who were with and without insurance coverage for computed tomographic (CT) colonography for CRC screening.

## Materials and Methods:

The institutional review board approved this retrospective cohort study, with a waiver of consent. This study used longitudinal electronic health record data from 2005 through 2010 for patients managed by one of the largest multispecialty physician groups in the United States. It included 33 177 patients under age 65 who were eligible and due for CRC screening and managed by the participating health system. Stratified Cox regression models provided propensity-adjusted hazard ratios (HRs) and 95% confidence intervals (CIs) for the relationship between CT colonography coverage and CRC screening.

## Results:

After adjustment, patients who had insurance coverage for CT colonography and were due for CRC screening had a 48% greater likelihood of being screened for CRC by any method compared with those without coverage who were due for CRC screening (HR, 1.48; 95% CI: 1.41, 1.55). Similarly, patients with CT colonography coverage had a greater likelihood of being screened with CT colonography (HR, 8.35; 95% CI: 7.11, 9.82) and with colonoscopy (HR, 1.38; 95% CI: 1.31, 1.45) but not with fecal occult blood test (HR, 1.00; 95% CI: 0.91, 1.10) than those without such insurance coverage.

## Conclusion:

Insurance coverage of CT colonography for CRC screening was associated with a greater likelihood of a patient being screened and a greater likelihood of being screened with a test that helps both to detect cancer and prevent cancer from developing (CT colonography or colonoscopy).

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Despite steady decreases in incidence and mortality from colorectal cancer (CRC), it remains the second leading cause of cancer-related mortality and is responsible for an estimated 50 000 deaths each year (1). CRC should be largely preventable if identified early, yet CRC screening rates remain suboptimal (2,3). Yet, after nearly a decade of continuous improvement (from 54% of the U.S. population up to date in 2002% to 65% in 2010), CRC screening rates have plateaued at 65% from 2010 to 2012 (2).

Greater use of alternative CRC screening methods has been proposed as one strategy to improve screening rates

(4,5). It has been suggested that the common practice in the United States of universally recommending colonoscopy may contribute to lower screening rates by not recognizing substantial variation in patient preferences and desire for choice (4–7). Prospective and randomized studies have also suggested that allowing patients to choose between two types of CRC screening tests increases participation in screening (4,7,8) and may increase the use of both tests (8), although these findings are not consistent (9,10).

In the United States, recent guidelines support screening methods that can both help detect cancer and prevent cancer from developing (eg, colonoscopy; computed tomographic [CT] colonography) over methods that depict cancer after it develops (eg, stool-based tests such as fecal occult blood test (FOBT) or stool DNA) (11). CT colonography is relatively new and able to depict both precancerous polyps and cancers, but is not widely covered by insurance for CRC screening, most notably Medicare. Two randomized controlled trials have shown a 55%–90% increase in CRC screening with CT colonography over colonoscopy, although individuals were not given a choice between the two tests (12,13). No studies have compared whether expanding the choice of insurance-covered options for CRC screening to include CT colonography could further increase overall screening rates.

We examined whether insurance coverage of CT colonography as an alternative choice for CRC screening was associated with higher overall CRC screening rates or, alternatively, whether overall screening rates remained stable but only the type of tests used for CRC screening differed. In this study, a substantial proportion

of patients eligible for CRC screening had commercial insurance coverage of CT colonography as a CRC screening method (more than 18 000 eligible patients each year). Our goal was to compare overall CRC screening rates for patients who were eligible and due for CRC screening and who were with and without insurance coverage of CT colonography for CRC screening.

### Advances in Knowledge

- Among eligible patients who became due for colorectal cancer (CRC) screening, there was a 48% greater likelihood of CRC screening by any method for patients who had insurance coverage for CT colonography when compared with those who did not have coverage (hazard ratio [HR], 1.48; 95% confidence interval [CI]: 1.41, 1.55).
- Patients who had insurance coverage for CT colonography and were due for CRC screening were substantially more likely to be screened with CT colonography than those without such insurance coverage who were due for CRC screening (HR, 8.35; 95% CI: 7.11, 9.82).
- Patients who had insurance coverage for CT colonography and were due for CRC screening also had a 38% greater likelihood of being screened with colonoscopy as the screening method than those without such insurance coverage who were due for CRC screening (HR, 1.38; 95% CI: 1.31, 1.45).
- CT colonography screening accounted for 11% (1945 of 17 144) of all screening studies performed over the 6-year study period.

### Implication for Patient Care

- Patients whose insurance plans cover the option of CT colonography for CRC screening may have higher CRC screening rates with a test that helps both detect cancer and prevent cancer from developing (CT colonography or colonoscopy).

### Materials and Methods

#### Duality of Interest

P.J.P. is a cofounder of VirtuoCTC; advisor to Bracco and Check-Cap; and a shareholder in Celectar, Elucent, and SHINE. D.H.K. is a cofounder of VirtuoCTC, a consultant for Viatronix, and a member of the Medical Advisory Board for Digital Artforms. None of these organizations provided support for this study. The remaining authors disclose no conflicts. The data were analyzed and controlled by authors (M.A.S., R.E.G., A.P.) who were not affiliated with nor employed by the above companies in the medical industry.

#### Population

This retrospective cohort study used longitudinal electronic health record

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#### Abbreviations:

CI = confidence interval  
 CRC = colorectal cancer  
 HR = hazard ratio  
 FOBT = fecal occult blood test  
 PCP = primary care provider

#### Author contributions:

Guarantors of integrity of entire study, M.A.S., A.P.; study concepts/study design or data acquisition or data analysis/interpretation, all authors; manuscript drafting or manuscript revision for important intellectual content, all authors; approval of final version of submitted manuscript, all authors; agrees to ensure any questions related to the work are appropriately resolved, all authors; literature research, M.A.S., J.M.W., L.A.W.F., P.J.P.; clinical studies, P.J.P.; statistical analysis, M.A.S., J.M.W., A.P., J.R.S., R.E.G., P.J.P.; and manuscript editing, M.A.S., J.M.W., A.P., J.R.S., R.E.G., L.A.W.F., P.J.P.

Conflicts of interest are listed at the end of this article.

data from a large academic medical center, one of the 10 largest multidisciplinary physician groups in the United States. Patients were included if eligible and due for CRC screening from 2005 through 2010, as defined by (a) at least 50 years of age; (b) not previously screened in the past year with FOBT; last 5 years with CT colonography, flexible sigmoidoscopy, or barium enema; or last 10 years with a colonoscopy; and (c) did not have a total colectomy. To maximize capture of screening results, patients were also included if they had at least (a) two office visits on different dates of service to a primary care provider (PCP) in the prior 36 months and (b) one office visit with a PCP in the most recent 24 months (14). Although we use an accepted approach to identify eligible individuals for CRC screening, we miss patients seen less frequently; these excluded patients represent a small percentage (8%) of the physician group's eligible primary care patients. We also excluded a small percentage of patients (1%) with a history of metastatic cancer (15). Because Medicare and Medicaid did not cover CT colonography for screening at any time during the study, patients were censored at the time they became eligible for Medicare or Medicaid insurance, if applicable.

The final sample was 33177 patients eligible and due for CRC screening at some point between 2005 and 2010, assigned to one of 270 PCPs and 30 clinics, and enrolled in any of 158 insurance plans. The Institutional Review Board approved this study with a waiver of consent.

### Setting

At the start of our study in 2005, available methods for CRC screening within the health system included colonoscopy, CT colonography, FOBT, flexible sigmoidoscopy, and barium enema. These options did not change during the study time frame. All PCPs in the physician group had equal and open access to all screening methods. All methods were identified as options under the physician group's CRC screening guidelines and were deemed adequate for CRC screening for the purposes of publicly

reporting CRC screening rates (16). All patients were required to visit and receive consultation from their PCP, with a subsequent referral to a gastroenterologist or radiologist prior to scheduling a screening colonoscopy or CT colonography. However, patients differed widely in whether their insurer covered CT colonography as an option for CRC screening, and four large insurers expanded their benefits during the study to include CT colonography as a covered option.

### Variables

The first outcome was the time to screening for CRC by any method. Other outcomes included time to screening for CRC with colonoscopy, time to screening for CRC with CT colonography, and time to screening for CRC with FOBT. Screening with barium enema was not separately considered as an outcome since it accounted for less than 0.1% (11 of 17144) of all screenings. Completion of CRC screening was identified through the presence of a procedure code for one of these methods, including codes for both diagnostic and screening procedures (17). If more than one code was present, the earliest code was used to determine the type (colonoscopy, CT colonography, FOBT, flexible sigmoidoscopy, or barium enema) and timing of screening.

The primary explanatory variable was time-varying by day and indicated whether a patient had insurance coverage for CT colonography as a CRC screening method (yes vs no) on each day that they were in the cohort.

We also accounted for potential residual confounding by variables that are known to affect CRC screening (18,19). We assessed patient characteristics, including age, sex, race (white, nonwhite), marital status (married, other), the percentage of the population in the patient's zip code with at least a high school education, the percentage of the population in the patient's zip code below the federal poverty line, rural-urban commuting area code (urban, suburban, large town, and small town/rural) (20), and the Johns Hopkins ACG (Adjusted Clinical Group)

health care utilization score (21), a statistically valid tool used to characterize a patient's prior health resource use while accounting for morbidity or illness burden. We included PCP characteristics that have previously been related to CRC screening such as sex, specialty (internal medicine/geriatrics or family medicine), annual panel size of patients eligible for CRC screening, primary clinic ownership (hospital- or physician-owned), and distance from the primary clinic to the nearest colonoscopy facility (18).

### Statistical Analysis

Stratified Cox regression models provided propensity-adjusted hazard ratios (HRs) and 95% confidence intervals (CIs) for the relationship between CT colonography coverage and CRC screening (22). Insurance coverage for CT colonography was included as a time-varying covariate for each patient. Patients entered the cohort on the date they became eligible and due for CRC screening and left if they were screened or became ineligible, resulting in 58461 patient-years. To avoid overcounting screening methods that are recommended more frequently, only the first period of eligibility was included (eg, for patients with FOBT screening who became eligible for CRC screening 1 year later, subsequent periods of eligibility were not included). As a result, patients were only in the cohort during the time that they were eligible and due for screening. We examined time to screening for several dependent variables, including screening by means of any method, colonoscopy, CT colonography, and FOBT. As is typical for Cox regression, patients were censored at the time of the first test even if they went on to have other tests (eg, a CT colonography was followed by a colonoscopy).

To construct propensity scores, a logistic regression predicting insurance coverage for CT colonography was fit by using all covariates as predictors, as well as indicator variables for each year. Specifically, insurance coverage was set to "yes" in a given calendar year if the patient had an insurer who covered CT colonography during the entire

year. The regression produced a propensity score for each person-year. The propensity score was categorized into bins of length of 0.05, for a total of 20 equally spaced bins between 0 and 1. These propensity score categories were treated as strata in the Cox model, thereby allowing each stratum to have its own baseline hazard. Percentages and means in Table 1 were adjusted by including indicators for the propensity score categories as control variables in a series of logistic regression models predicting CT colonography coverage. All regressions were estimated by using Stata version 13.1 (Stata, College Station, Tex), conservatively accounting for correlation by using robust estimates of the variance clustered by clinic.

To test the robustness of our results, we also performed several sensitivity analyses. We re-estimated models restricting our sample to patients who live within the largest central county to account for any missing data in the electronic health record. Second, we censored individuals who underwent a diagnostic procedure, as these procedures are unlikely to be affected by the availability of insurance coverage. Finally, we adjusted for the potential for bias due to self-selection into different insurance plans by limiting our sample to patients who were eligible and due for CRC screening and who were enrolled in one of four large insurance plans that expanded their coverage between 2005 and 2010 to include CT colonography for CRC screening. This approach allowed us to compare patients who were members of those four plans before the expanded coverage to patients who were members of those same plans after the expanded coverage.

## Results

### Population Characteristics

Patients were 54% female (18002 of 33177), 9% nonwhite (2795 of 32651), and 69% were married (22786 of 33130) (Table 1). About half of PCPs were female (142 of 270), and about half were internal medicine physicians (147 of 270). PCPs had an average of

17 CRC-eligible patients in the first year of the study cohort (2005). Clinics were primarily physician-owned (73%; 22 of 30) and averaged 8 miles to the nearest facility that conducted colonoscopy. Patients with CT colonography coverage were slightly more likely to be younger, white, married, and urban.

### Screening Characteristics

About one-quarter of patients eligible and due for CRC screening in any given year were screened during that year (Table 2), with about half (52%; 17144 of 33177) of eligible patients screened across all study years. Among all patients who were eligible and due for CRC screening (including those who did and those who did not have insurance coverage for CT colonography), most screenings were with colonoscopy (73%; 12599 of 17144), followed by FOBT (13%; 2214 of 17144) and CT colonography (11%; 1945 of 17144). Flexible sigmoidoscopy (2%; 375 of 17144) and barium enema (< 0.1%; 11 of 17144) were used rarely (not shown). The percentage of screenings that were with CT colonography was relatively stable over time. In contrast, the percentage of screenings with colonoscopy increased substantially (from 61% to 86%; from 2442 of 4035 to 2058 of 2393), and the percentage of screenings with FOBT declined substantially (from 19% to 4%; from 783 of 4035 to 95 of 2393).

### Insurance Coverage and CRC Screening

At any given time, among eligible patients who became due for CRC screening, there was a 48% greater likelihood of CRC screening by any method for patients who had insurance coverage for CT colonography when compared with those who did not have insurance coverage (HR, 1.48; 95% CI: 1.41, 1.55) (Table 3). As expected, patients who had insurance coverage for CT colonography were more likely to be screened by using CT colonography (HR, 8.35; 95% CI; 7.11, 9.82). Notably, there was also a greater likelihood of screening by using colonoscopy; patients with insurance coverage had a 38% greater likelihood of being screened by using colonoscopy as the screening method

(HR, 1.38; 95% CI: 1.31, 1.45). There was no significant difference in the likelihood of being screened by using FOBT (HR, 1.00; 95% CI: 0.91, 1.10).

### Sensitivity Analysis

To test the robustness of our results, we performed several sensitivity analyses (Table 3). First, as not all colonoscopies are documented in the electronic health record, it is possible that missing data on colonoscopies would affect our conclusions. We re-estimated models restricting our sample to 65% (21452 of 33177) of patients who live within the largest central county. In this county, the physician group has confirmed that 98.5% of patients who underwent colonoscopies did so within an outpatient clinic that uses the same electronic health record. Limiting to this subsample, our results did not differ significantly. Second, many screened patients (39%; 6735 of 17144) underwent procedures (colonoscopies and flexible sigmoidoscopies) for diagnostic purposes, and these procedures were unlikely to be affected by the availability of insurance coverage for CT colonography. We included these diagnostic procedures as they are included in well-established and standardized national quality metrics (17). However, removing these diagnostic procedures from consideration by censoring these individuals at the time of their diagnostic procedure also did not change our conclusions.

We also conducted a sensitivity analysis to address the potential for bias due to patient self-selection into different insurance plans (data not shown) (23,24). Our conclusions did not change. Specifically, we limited our sample to 6669 patients who were eligible and due for CRC screening and who were enrolled in one of four large insurance plans that expanded their coverage between 2005 and 2010 to include CT colonography for CRC screening. After adjustment, patients whose options expanded to include CT colonography had an 18% greater likelihood of being screened by any method compared with those without coverage (HR, 1.18; 95% CI: 1.06, 1.32). Patients with CT colonography coverage had a greater likelihood of being screened by CT colonography (HR, 4.11;

**Table 1**

**Patient, PCP, and Clinic Characteristics**

Characteristic	Overall	CT Colonography Coverage*	No CT Colonography Coverage*	P Value	
<b>Patient characteristics</b>					
Age at time of first cohort entry (y)	56.1	55.8	56.5	<.01	
Female	18 002 (54)	53	55	.57	
Non-White	2795 (9)	7	8	.03	
Married	22 786 (69)	75	68	.02	
<b>Education quintile</b>					
First (low < 0.04)	7238 (22)	23	21	.43	
Second (low-medium 0.04–0.044)	7674 (23)	25	22		
Third (medium 0.044–0.52)	6236 (19)	20	21		
Fourth (medium-high 0.052–0.083)	5191 (16)	17	17		
Fifth (high > 0.83)	6567 (20)	15	19		
<b>Poverty quintile</b>					
First (low < 0.045)	7629 (23)	25	23	.39	
Second (low-medium 0.045–0.068)	5602 (17)	18	18		
Third (medium 0.068–0.096)	9488 (29)	29	29		
Fourth (medium-high 0.096–0.12)	4289 (13)	13	13		
Fifth (high > 0.12)	5898 (18)	15	17		
<b>Rural-urban commuting area</b>					
Urban core area	23 190 (70)	71	68	.01	
Suburban area	7263 (22)	24	24		
Large town area	718 (2)	1	1		
Small town and isolated rural areas	1901 (6)	4	6		
<b>ACG quintile</b>					
First (low < 0.31)	10 253 (31)	29	32	.07	
Second (low-medium 0.31–0.40)	3533 (11)	11	11		
Third (medium 0.40–0.48)	6731 (20)	21	19		
Fourth (medium-high 0.48–0.65)	6036 (18)	19	17		
Fifth (high > 0.65)	6624 (20)	20	21		
<b>PCP characteristics (n = 270)<sup>†</sup></b>					
Female	142 (53)	...	...	...	
<b>PCP specialty</b>					
Internal medicine/geriatrics	123 (54)	...	...		
Family medicine	147 (46)	...	...		
No. of eligible patients per PCP in 2005 <sup>‡</sup>	17 ± 13	...	...		
<b>Clinic characteristics (n = 30)<sup>†</sup></b>					
Hospital owned	8 (27)	...	...		
Physician owned	22 (73)	...	...		
Miles to nearest colonoscopy facility <sup>‡</sup>	8 ± 5	...	...		

Note.— Unless otherwise indicated, data are the number of patients and numbers in parentheses are percentages. ACG = Johns Hopkins ACG healthcare utilization score.

\* Values are adjusted for propensity score categories.

<sup>†</sup> PCPs and clinics treat patients with and patients without CT colonography coverage; therefore, their characteristics do not differ, and they are not presented separately.

<sup>‡</sup> Data are mean ± standard deviation.

95% CI: 2.70, 6.23) and by colonoscopy (HR, 1.23; 95% CI: 1.09, 1.38) but not by FOBT (HR, 0.69; 95% CI: 0.40, 1.18).

**Discussion**

Our findings show that insurance coverage for CT colonography as an

alternative option for CRC screening was associated with a greater likelihood of CRC screening among eligible patients who were due for CRC screening and was also associated with a greater likelihood of being screened with a test that helps both to detect cancer and prevent cancer from developing

(CT colonography or colonoscopy). Specifically, insurance coverage of CT colonography was associated with an increase in overall CRC screening rates, increase in screening by CT colonography, increase in screening by colonoscopy, and no change in screening by FOBT. A comparable study of

**Table 2**

**Unadjusted Screening Rates by Year**

Year	Total No. of Patients Eligible during Year	Total No. of Screenings	Screenings That Were CT Colonography	Screenings That Were Colonoscopy	Screenings That Were FOBT	Total No. of Patients with Any CT Colonography Coverage
2005	15 366	4035 (26)	520 (13)	2442 (61)	783 (19)	8814 (57)
2006	13 211	3199 (24)	427 (13)	2125 (66)	604 (19)	7985 (60)
2007	10 565	2129 (20)	271 (13)	1508 (71)	333 (16)	6396 (61)
2008	11 628	2616 (22)	253 (10)	2094 (80)	261 (10)	7406 (64)
2009	10 962	2772 (25)	248 (9)	2372 (86)	138 (5)	8045 (73)
2010	9371	2393 (26)	226 (9)	2058 (86)	95 (4)	6823 (73)
All years	33 177	17 144 (52)	1945 (11)	12 599 (73)	2214 (13)	22 887 (69)

Note.—Data in parentheses are percentages.

**Table 3**

**Relationship between CT Colonography Coverage and CRC Screening**

Variable	HR*		
	Overall (58 461 Patient-years)	Limited to Residents of the Central County (37 790 Patient-years)	Limited to Screening Procedures Only (58 461 Patient-years)
Any screening	1.48 (1.41, 1.55)	1.44 (1.37, 1.5)	1.50 (1.39, 1.62)
Screened with CT colonography	8.35 (7.11, 9.82)	7.66 (6.19, 9.48)	8.47 (7.22, 9.93)
Screened with colonoscopy	1.38 (1.31, 1.45)	1.33 (1.26, 1.41)	1.30 (1.22, 1.38)
Screened with FOBT	1.00 (0.91, 1.1)	1.00 (0.89, 1.11)	1.00 (0.91, 1.1)

Note.—Models adjusted for sex, race, marital status, education status quintile, poverty status quintile, rural-urban commuting area code, Johns Hopkins ACG score quintile, age, PCP gender, PCP practice, PCP panel size at baseline, clinic ownership, and distance from clinic to nearest colonoscopy facility.

\* Data in parentheses are 95% CIs.

expanding Medicare insurance coverage in the United States in 2001 to cover screening colonoscopy also showed increased overall CRC screening rates and increased use of colonoscopy for screening, as well as decreased use of flexible sigmoidoscopy and FOBT (25).

Although higher rates of CRC screening with CT colonography were expected for those with insurance coverage for CT colonography, our results are also consistent with evidence that patients who are offered a choice of CRC screening tests are more likely to complete screening than patients offered either type of test alone (4,7,8). In one of these prior studies, patients were randomized to (a) a choice between one-time colonoscopy and fecal immunochemical test (FIT) annually for up to 3 years, (b) one colonoscopy, or (c) FIT annually for up to 3 years. The rate of overall screening was higher among those who had a choice

(86% vs 70%) (8). Similar to our study, this was not solely due to additional individuals receiving screening by a second test. The rates of both FIT and colonoscopy were higher among those who had a choice. The group that chose colonoscopy over FIT was more likely to complete colonoscopy than the group that was assigned colonoscopy (96% vs 91%), and the group that chose FIT over colonoscopy was more likely to complete FIT than the group that was assigned FIT (73% vs 63%).

A choice of screening technologies might serve to increase participation in CRC screening due to greater engagement in screening decisions (26). Nearly all individuals (96%) prefer to be offered treatment choices, discuss options, and share their opinions about possible approaches (27). Consistent with this, the physician group required that all patients receive consultation

from their PCP prior to scheduling a CRC screening test during the years of this study. PCPs and patients with an additional option to colonoscopy may have been more likely to engage in “choice talk” (ie, notification that reasonable options or choices are available) (28). The availability of choice itself may serve to engage the patient and increase participation (29). This may explain our finding that patients with insurance coverage for both colonoscopy and CT colonography had increased overall CRC screening rates, with increases in both colonoscopy and CT colonography. Because PCPs in the United States overwhelmingly recommend colonoscopy as the preferred option (4,5,30,31), discussions prompted by the availability of additional options may have resulted in a decision to screen by colonoscopy.

Increased choice of screening technologies may have also allowed patients

to choose an option that corresponded best with their preferences (6,7). Patients vary in their preference for colonoscopy or CT colonography for CRC screening (6,32,33), and some patients may not participate in screening if only a single option is offered with no alternative. Two separate studies found that up to one-third of individuals undergoing CT colonography screening may not have been screened if CT colonography were not available (34,35), and a Dutch randomized controlled trial showed a 55% increase in screening participation among those offered CT colonography (compared with those offered colonoscopy) (13). PCP recommendations for CRC screening tests should be based at least partly on patient preferences and likely adherence (36).

Only a minority of patients (11%) used CT colonography for screening. CT colonography is a relatively new screening test and was not yet recommended by the U.S. Preventive Services Task Force (USPSTF) during the study timeframe. As such, substantial variation in PCP adoption of CT colonography existed at our institution (37). Uptake in other centers throughout the United States is currently much lower. There are several possible approaches to increase use, including recent inclusion in guidelines (eg, USPSTF), coverage by additional insurers such as the Center for Medicare and Medicaid Services for Medicare beneficiaries, and broader acceptance by PCPs (37). Primarily, due to lack of coverage for Medicare beneficiaries, utilization at the study center has not yet increased since 2010.

There are strengths and limitations to this study. First, we report findings from a single large multispecialty physician group, although it is the only center in the United States for whom a large proportion of patients eligible for CRC screening have had insurance coverage for CT colonography as a screening method over an extended period of time (38). Second, despite propensity score adjustment, there may still be unobserved variables associated with CT colonography coverage and CRC screening rates. For example, patients

may self-select into different insurance plans by age, sex, educational attainment, household income, employment, and health status/utilization (23,24). To assess this bias, we conducted a sensitivity analysis that limited our sample to patients who were enrolled in one of four large insurance plans that expanded their coverage during the study years to include CT colonography for CRC screening. This approach allowed us to compare patients who were members of those four plans before the expanded coverage to patients who were members of those same plans after the expanded coverage, thereby reducing bias due to patient self-selection into insurance plans. Our conclusions did not change with this analysis. In addition, our use of Cox regression does account for temporal trends such as an increasing trend over time in the rate of CRC screening. Finally, we examined guaiac-based FOBT as the only stool-based CRC screening option; both fecal immunochemical and stool DNA tests were not introduced to this physician group until after this study.

We conclude that insurance coverage of CT colonography as an additional option for CRC screening is associated with greater likelihood of a patient being screened and a greater likelihood of being screened using a preventive test (CT colonography or colonoscopy). Policymakers should consider additional options for CRC screening when considering strategies to increase overall screening rates.

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