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Initiation of Colorectal Cancer Screening Among Medicaid Enrollees

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Abstract

Introduction—Few studies have explored how individual- and practice-level factors influence colorectal cancer screening initiation among Medicaid enrollees newly age eligible for colorectal cancer screening (i.e., turning 50 years). This study explored colorectal cancer screening initiation among newly age-eligible Medicaid enrollees in Oregon.

Methods—Medicaid claims data (January 2013 to June 2015) were used to conduct multivariable logistic regression (in 2018 and 2019) to explore individual- and practice-level factors associated with colorectal cancer screening initiation among 9,032 Medicaid enrollees.

Results—A total of 17% of Medicaid enrollees initiated colorectal cancer screening; of these, 64% received a colonoscopy (versus fecal testing). Colorectal cancer screening initiation was positively associated with turning 50 years in 2014 (versus 2013; OR=1.21), being Hispanic (versus non-Hispanic white; OR=1.41), urban residence (versus rural; OR=1.23), and having 4 to 7 (OR=1.90) and 8 or more (OR=2.64) primary care visits compared with 1 to 3 visits in the year after turning 50 years. Having 3 or more comorbidities was inversely associated with initiation

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SUPPLEMENTAL MATERIAL

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(OR=0.75). The odds of screening initiation were also higher for practices with 3 to 4 (OR=1.26) and 8 or more (OR=1.34) providers compared with 1 to 2 providers, and negatively associated with percentage of Medicaid panel age eligible for colorectal cancer screening (OR=0.92).

Conclusions—Both individual- and practice-level factors are associated with disparities in colorectal cancer screening initiation among Oregon Medicaid enrollees. Future work promoting colorectal cancer screening might focus on additional barriers to the timely initiation of colorectal cancer screening and explore the effect of practice in-reach and population outreach strategies.

INTRODUCTION

Colorectal cancer (CRC) is the second most common cause of cancer death in the U.S.^{1,2} The U.S. Preventive Services Task Force recommends that screening for CRC begin at age 50 years for average-risk adults and endorses high-sensitivity fecal occult blood testing (FOBT) every year, sigmoidoscopy every 5 years, or colonoscopy every 10 years.³ Despite the availability of effective screening tools, screening for CRC remains widely underutilized.⁴ National data suggest that only 60% of publicly insured and 65% of privately insured individuals are up-to-date with the CRC screening guidelines,⁴ with significant disparities in Medicaid and Hispanic populations. Medicaid enrollees are more likely to present with advanced-stage cancers than individuals with private or Medicare insurance,⁵ and approximately 45% of those aged 50–64 years are up-to-date with the CRC screening guidelines.⁶ Although 47.4% of Hispanics in the general population are up-to-date with CRC screening guidelines compared with 64.2% of non-Hispanic whites,⁴ 50.7% of Hispanic Medicaid enrollees are up-to-date with CRC screening guidelines compared with 42.8% of non-Hispanic white Medicaid enrollees.⁶

Suboptimal CRC screening among Medicaid enrollees confirms that even with health insurance coverage, low-income and publicly insured individuals face multiple barriers to CRC screening.^{7–9} Insured individuals who go unscreened cite a lack of trust in physicians, lack of symptoms, fatalistic views, and no provider recommendation for screening.¹⁰ Other studies report patients not understanding the benefits of early detection and financial concerns.¹¹ Provider perceptions of patient barriers may also influence CRC screening. Studies find that providers believe patients have low or no awareness of the benefits of early detection, are fearful about cancer, are embarrassed about the screening tests, and have concerns about test preparation.^{12,13} Other barriers to screening include practice-level characteristics, such as panel size, distance to the nearest endoscopy center, and management structure (e.g., physician versus hospital owned; team-based structure).^{12,14}

Although studies have identified multiple barriers to CRC screening, they have often examined up-to-date CRC screening among individuals aged 50–75 years and use surveys, focus groups, and electronic medical records.^{10–12,14} Only a handful of studies have explored CRC screening among Medicaid enrollees or those newly age eligible for CRC screening (that is, turning 50 years), during the use of claims data.^{9,15–18} Yet, Davis and colleagues⁹ found disparities in CRC screening initiation when comparing publicly and commercially insured individuals: 35% of newly age-eligible individuals with Medicaid had initiated screening compared with 43% with commercial insurance.

Given that Medicaid serves 1 in 5 low-income Americans—most of whom have complex and costly healthcare needs¹⁹—it is critical to explore the barriers to CRC screening initiation within the Medicaid population. This study explores individual- and practice-level factors within a newly age-eligible population of Medicaid enrollees in Oregon to determine the predictors of CRC screening initiation.

METHODS

Timely and reliable Medicaid enrollment and claims data (January 2013 to June 2015) were obtained from the Oregon Health Authority²⁰ under a data use agreement with the Oregon Health & Science University. The data included monthly enrollment numbers, demographic information, and claims data for enrollees with healthcare encounters. The IRBs at Oregon State University and the Oregon Health & Science University approved the study.

Study Population

This study identified 21,671 Medicaid enrollees newly age eligible for CRC screening (i.e., turned age 50 years between January 2013 and June 2014) (Figure 1). To maximize the ability to detect CRC screening, individuals dually enrolled in Medicaid and Medicare were excluded (the study could not access Medicare claims data), as were those enrolled in Medicaid for <9 months following their 50th birthday. As Oregon provides 12-month continuous eligibility for adults enrolled in Medicaid,²¹ this criterion provides a conservative estimate of CRC screening. Others excluded were those deceased during the study period or had any of the following disqualifying conditions (per International Classification of Diseases, Ninth revision or Current procedural terminology [CPT] codes): a personal history of CRC, total colectomy, or end-stage renal disease.^{9,22} Enrollees not assigned to a coordinated care organization (CCO) were excluded because Medicaid claims data were not available. CCOs are locally governed coalitions of healthcare providers and stakeholders responsible for medical, behavioral, and dental services to Medicaid enrollees.²³ Whereas almost all Medicaid enrollees were assigned to CCOs,²⁴ not all enrollees could be attributed to a primary care practice. Enrollees could not be attributed to a practice when they had no primary care visits 12 months prior and 12 months after their 50th birthday; the claim had no valid national provider identifier, or the national provider identifier was not in the provider/practice directory provided by the Oregon Health Care Quality Corporation.²⁵ Of the 9,032 enrollees remaining in the study, 4,285 were attributed to and 4,747 were not attributed to a primary care practice.

Measures

The primary outcome variable was CRC screening initiation, defined as the receipt of any CRC screening (i.e., FOBT, fecal immunochemical test, or colonoscopy) in the year after turning 50 years. The outcome was coded as a binary variable (CRC screening initiation versus no CRC screening initiation). Because there were only 9 sigmoidoscopy screenings (<1% of total CRC screenings), they were excluded from the analyses. CRC testing was identified by International Classification of Diseases, Clinical Modification; CPT; or Healthcare Common Procedure Coding System codes (Appendix Table 1, available online). As prior research has shown that coding for colonoscopy type is not always accurate, both

screening and diagnostic billing codes were included for colonoscopy.^{22,26} The test with the earliest screening date was coded when a claim indicated multiple screening tests. When a claim included multiple screening tests on the same day, the most invasive test received was coded (e.g., colonoscopy over fecal immunochemical testing/FOBT).

Individual- and practice-level variables included in this analysis were selected based on their significance in the research literature. Individual-level characteristics were sex (male versus female), race/ethnicity (non-Hispanic white versus Hispanic versus other), geographic residence (urban versus rural or frontier), comorbidities (0 versus 1 to 2 versus 3 or more), and primary care visits (0 versus 1 to 3 versus 4 to 7 versus 8 or more) in the year after turning 50 years. Owing to sample sizes, the “other” category for race/ethnicity combined African American, Asian/Pacific Islander, American Indian/Alaskan Native, and other/unknown. For geographic residence, enrollee ZIP codes were categorized into 3 geographic locations using the ZIP code version of the Rural–Urban Commuting Areas taxonomy based on population density, urbanization, and daily commuting patterns: urban (≥ 50,000), rural (2,500–49,999), and frontier (<2,500).²⁷ Because few enrollees lived in frontier regions, rural and frontier geographic regions were combined into one category. Comorbidities were identified using the Chronic Illness and Disability Payment System index that was developed specifically for use in risk adjusting Medicaid populations.²⁸ Each member’s 12-month claims history was reviewed for the presence (yes, no) of comorbidity categories. Primary care visits were determined based on the member ID and distinct dates of service and counted when the following CPT codes appeared in the claims: 99201–99205, 99211–99215.²⁹

Practice-level characteristics were patient-centered primary care home (PCPCH) recognition (versus non-PCPCH), number of providers (1 to 2 versus 3 to 4 versus 5 to 7 versus 8 or more), presence of an endoscopy facility within the practice ZIP code (yes versus no), and percentage of Medicaid panel age eligible for CRC screening (continuous in increments of 10 percentage points). A PCPCH is Oregon’s version of a medical home in which “primary care is patient-centered, comprehensive, team-based, coordinated, accessible, and focused on quality and safety.”³⁰ PCPCH status was obtained from publicly reported data from the Oregon Primary Care Association.³¹ The presence of an endoscopy facility within a practice’s ZIP code was determined by matching the ZIP codes for all endoscopy facilities where colonoscopies were performed to the ZIP codes for each primary care practice. A match in the ZIP codes was coded as 1=the presence of an endoscopy facility within the practice’s ZIP code, otherwise it was coded as 0=no endoscopy facility within the practice’s ZIP code.

Statistical Analysis

Descriptive statistics summarized individual- and practice-level characteristics, and a multivariable logistic regression model predicted CRC screening initiation. The multivariable logistic regression model was conducted with SEs clustered at the practice and CCO levels, and included all individual- and practice-level independent variables. Missing data for primary care practices not attributed to study enrollees were handled as follows: an “unknown” category was created for PCPCH recognition and endoscopy facility in the

practice ZIP code, and the median value was used for number of providers and percent of Medicaid panel age eligible for CRC screening. Owing to multicollinearity between “unknown” PCPCH and “unknown” endoscopy facility in the practice ZIP code, the latter variable was dropped from the regression analysis. The data analysis was conducted in 2018 and 2019 at a two-sided significance level of 0.05 using R, version 3.4.4.

RESULTS

Table 1 provides descriptive statistics for the 9,032 study-eligible Medicaid enrollees who turned age 50 years in 2013 (51%) and 2014 (49%). Sixty-nine percent of enrollees self-identified as non-Hispanic white; 13% self-identified as Hispanic, and 18% were an other race/ethnicity. More than half (57%) of the enrollees lived in an urban area, and 53% had more than one comorbidity. Enrollees had a mean of 5 primary care visits, and 75% had at least 1 primary care visit in the year after turning 50 years. Although the number of visits ranged from 0 to 58, only 1 enrollee had 58 visits, 3 had >50, and 14 had >40 visits (data not shown). Overall, 17% ($n=1,493$) of enrollees initiated CRC screening, that is, received any CRC screening in the year after turning 50 years; of these, 64% received a colonoscopy. There were significant differences in the outcome by enrollee residence ($p<0.001$), comorbidities ($p<0.001$), and primary care visits ($p<0.001$). The results of a stratified analysis of the individual characteristics by race/ethnicity are in Appendix Table 2, available online. Table 2 presents data on the 467 primary care practices attributed to the study population. Almost 60% of the practices had achieved PCPCH recognition, and had a mean of 6 providers. Seventy-five percent of practices had an endoscopy facility within their ZIP code; on average, 27% of their Medicaid panel was age eligible for CRC screening.

Multivariable analysis of CRC screening initiation Table 3 identified the following significant individual-level predictors: year turned age 50 years, race/ethnicity, residence, comorbidities, and primary care visits. Significant practice-level predictors of the outcome were number of providers and percentage of Medicaid panel age eligible for CRC screening. Medicaid enrollees who turned age 50 years in 2014 (compared with 2013) had greater odds (OR=1.21, 95% CI=1.08, 1.34) of CRC screening initiation, as did Hispanics (OR=1.41, 95% CI=1.29, 1.54) compared with non-Hispanic whites, and urban (OR=1.23, 95% CI=1.10, 1.38) compared with rural/frontier residence. Three or more (OR=0.75, 95% CI=0.66, 0.85) comorbidities were inversely associated with CRC screening initiation. The odds of CRC screening initiation were higher for enrollees with 4 to 7 (OR=1.90, 95% CI=1.71, 2.11) and 8 or more (OR=2.64, 95% CI=2.34, 2.98) primary care visits compared with 1 to 3 visits. Similarly, the odds of the CRC screening initiation were higher for practices with 3 to 4 (OR=1.26, 95% CI=0.98, 1.62) and 8 or more (OR=1.34, 95% CI=1.06, 1.69) providers compared with 1 to 2 providers. CRC screening initiation was negatively associated with the percentage of the Medicaid panel age eligible for CRC screening (OR=0.92, 95% CI=0.85, 0.99).

DISCUSSION

Among newly age-eligible Medicaid enrollees in Oregon, 17% initiated CRC screening, that is, received any CRC screening in the first year after turning 50 years; of these, 64%

received a colonoscopy, which is consistent with the previous research of publicly insured adults.^{15,32,33} A CRC screening initiation was associated with race/ethnicity, residence, comorbidities, primary care visits, number of providers, and percentage of Medicaid panel aged eligible for CRC screening. The finding that <20% of Oregon Medicaid enrollees initiated CRC screening in the first year after turning 50 years is lower than the 51% rate reported for a similar-aged population at Kaiser Permanente Northern California.¹⁶ Although one would not expect a statewide sample of Medicaid enrollees to achieve CRC screening rates on par with an integrated delivery system, these data suggest room for improvement. The rate in this study is also lower than that based on the 2015 National Health Interview Survey: 45% of adults aged 50–54 years reported CRC screening.³⁴

Results showing that Hispanic enrollees compared with non-Hispanic whites had higher odds of CRC screening initiation are consistent with results from the Medicaid and Children's Health Insurance Program Access Commission: Hispanic Medicaid enrollees have higher up-to-date CRC screening than non-Hispanic white enrollees (50.7% vs 42.8%, respectively).⁶ Given that Hispanics in the general population have relatively low CRC screening, taken together, these findings underscore the importance of Medicaid coverage for Hispanics. Indeed, prior research has found positive associations between public insurance and CRC screening among Hispanics,^{s35} even with regard to breast and cervical cancer screening.^{36,37}

Study findings that urban residents have higher odds of CRC screening initiation are consistent with prior research from Davis et al.,⁹ who found that both Medicaid and commercially insured, newly age-eligible, urban residents in Oregon had higher CRC screening beginning at age 50 years. The disparity is likely a result of rural residents facing transportation and access barriers, including costs of care, especially for colonoscopy screening.^{9,38}

The results on comorbidities (among enrollees with healthcare encounters) may be explained by competing demands, that is, medical attention focuses on managing comorbidities rather than delivering preventive services, and are consistent with most research on up-to-date CRC screening. The Oregon Rural Practice-based Research Network found that 3 or more chronic conditions (among adults aged 50–75 years) was associated with not being up-to-date with breast, cervical, and CRC screening.³⁹ An evaluation of an organized CRC screening program for adults aged 50–59 years also found 3 or more chronic conditions associated with lower rates of fecal testing.⁴⁰ A study of patients with mostly private and public insurance within accountable care organizations, by contrast, found higher up-to-date CRC screening among patients with 1 or more comorbidities.¹⁴ Although there is some evidence that comorbidity severity might affect CRC screening, especially among newly age-eligible women,¹⁸ more research is needed.

Study results also confirm prior findings that number of primary care visits is positively associated with CRC screening.⁴¹ Patient visits—whether for the management of comorbidities or general prevention—create opportunities for providers to recommend CRC screening to their patients.⁴² A study comparing practice in-reach to population outreach strategies for Latinos in a primary care setting reported that practice in-reach achieved

higher CRC screening.⁴³ Research underway by this study team suggests that primary care practices with high CRC screening among Medicaid enrollees use a combination of practice in-reach and population outreach strategies, and that the latter may improve access to fecal immunochemical testing or FOBT for patients outside scheduled primary care visits (Davis, Oregon Health & Science University, unpublished observations, 2019). Similarly, the greater odds of CRC screening initiation in practices with 3 to 4 and 8 or more providers may reflect the ability of providers and practices to outreach to individuals due for screening or to implement population management programs in addition to visit-based care.^{44,45} In contrast, a greater percentage of a practice's Medicaid panel that is age eligible for CRC screening may create an additional burden on the practice and thus negatively affect CRC screening initiation. Although prior research found that a larger patient panel of individuals aged 50–75 years eligible for CRC screening was associated with being up-to-date with the screening, the study was conducted within a large academic physician group, and only 1% of the patients were covered by Medicaid.¹²

Limitations

This study has limitations. The study relied exclusively on administrative claims data, which meant no access to individual-level data on socioeconomic factors (e.g., income, education, employment, English language proficiency), health beliefs (e.g., perception of risk for developing CRC, benefits of early detection), or lifestyle factors (e.g., smoking, alcohol use) that might affect CRC screening initiation or highlight the differences among racial/ethnic groups, particularly between Hispanics and non-Hispanic whites. Additionally, there are limited data on primary care practices, and thus are missing important aspects about the practices, such as the degree to which they implement specific strategies, use of team-based care, patient reminders, and population outreach strategies, which might influence screening. CRC screening initiation may be under-reported in claims data if a claim is not submitted or services are received from a non-Medicaid third party, at no cost, paid out of pocket, or obtained before turning 50 years. In addition, these findings may not generalize to other settings or populations, as this analysis was conducted in Oregon. Last, this study examined differences in individual-level characteristics by race/ethnicity (Appendix Table 2, available online), but did not explore the heterogeneity within Hispanics and non-Hispanic whites in detail that might otherwise lead to a better understanding of CRC screening initiation within these 2 racial/ethnic groups.

CONCLUSIONS

Among this newly age-eligible Medicaid population, only 17% of Medicaid enrollees initiated CRC screening, that is, received any CRC screening in the year after turning 50 years. However, during the past decade, Oregon has been actively involved in efforts to increase CRC screening. Compared with 2010, Oregon has experienced a significant increase in CRC screening among newly age-eligible individuals who enrolled in Medicaid during 2013 and 2014.¹⁷ In 2012, Oregon transformed its healthcare system, created CCOs to deliver integrated care to Medicaid enrollees, and provided incentives to improve specific outcomes, including CRC screening. Additionally, Oregon received funding from the Centers for Disease Control and Prevention (2009–2015) to implement evidence-based

interventions, such as patient/provider reminders, small media, patient navigation, and targeted outreach by community health workers, within their health system.⁴⁶ Since 2011, Oregon has had a statewide campaign to raise the CRC screening rates with special emphasis on African Americans, Native Americans, and Spanish-speaking communities.⁴⁷ This may explain why Hispanics had a higher CRC screening initiation. In general, the findings highlight the need to conduct future research within all racial/ethnic groups covered by Medicaid given the observed disparity in CRC screening initiation between Hispanics and non-Hispanic whites, and in rural settings. Further, future work promoting CRC screening might focus on additional barriers to timely initiation and explore the effect of practice in-reach and population outreach strategies.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.

Study inclusion and exclusion criteria

CCO, coordinated care organization; CRC, colorectal cancer; Jan., January.

Table 1.

Characteristics of Newly Age-Eligible Medicaid Enrollees in Oregon (2013–2014)

Characteristics	Total (n=9,032), n (%)	CRC screening initiation, ^a n (%)
Year turned aged 50 years		
2013	4,641 (51)	733 (49)
2014	4,391 (49)	760 (51)
Sex		
Female	4,797 (53)	843 (57)
Male	4,235 (47)	650 (43)
Race/ethnicity		
Non-Hispanic white	6,215 (69)	1,016 (68)
Hispanic	1,183 (13)	213 (14)
Other	1,634 (18)	264 (18)
Residence		
Rural/frontier	3,849 (43)	573 (38)
Urban	5,183 (57)	920 (62)
Comorbidities		
0	4,228 (47)	504 (34)
1–2	2,702 (30)	543 (36)
3	2,102 (23)	446 (30)
Primary care visits ^b		
0	2,400 (27)	54 (4)
1–3	2,575 (29)	387 (26)
4–7	2,020 (22)	482 (32)
8	2,037 (22)	570 (38)
CRC screening initiation	1,493 (17)	
Modality of CRC screening		
Colonoscopy	949 (64)	—
Fecal test (FIT/FOBT)	535 (36)	—
Sigmoidoscopy ^c	9 (<1)	—

Note: Boldface indicates statistical significance ($p < 0.05$).

^a i.e., receipt of any CRC screening in the year after turning aged 50 years.

^b Median: 3; mean (SD): 5 ± 6 ; range: (0–58).

^c Enrollees with screening sigmoidoscopy were excluded from all analyses.

CRC, colorectal cancer; FIT/FOBT, fecal immunochemical test/fecal occult blood test.

Table 2.

Characteristics of Primary Care Practices With Attributed Newly Age-Eligible Medicaid Enrollees in Oregon

Characteristics	Total (n=467), n (%)
Patient-centered primary care home	
Yes	276 (59)
No	191 (41)
Number of providers	Median: 4 Mean: 6 ± 6 Range: 1,61
1–2	151 (32)
3–4	113 (24)
5–7	96 (21)
8	107 (23)
Endoscopy facility in ZIP code	
Yes	350 (75)
No	117 (25)
Percent Medicaid panel age eligible for colorectal cancer screening	Mean: 27 ± 12 Range: 2.5–59.5

Table 3.Multivariable Logistic Regression of CRC Screening Initiation,^a *n*=9,032

Characteristics	OR	95% CI
Individual level		
Year turned aged 50 years		
2013	Ref	Ref
2014	1.21	1.08, 1.34
Sex		
Female	Ref	Ref
Male	1.10	0.91, 1.31
Race/ethnicity		
Non-Hispanic white	Ref	Ref
Hispanic	1.41	1.29, 1.54
Other	1.13	0.99, 1.30
Residence		
Rural/frontier	Ref	Ref
Urban	1.23	1.10, 1.38
Comorbidities		
0	Ref	Ref
1–2	0.93	0.84, 1.03
3	0.75	0.66, 0.85
Primary care visits		
1–3	Ref	Ref
4–7	1.90	1.71, 2.11
8	2.64	2.34, 2.98
0	0.14	0.07, 0.29
Practice level		
Patient-centered primary care home		
No	Ref	Ref
Yes	0.91	0.77, 1.09
Unknown	0.83	0.67, 1.03
Number of providers		
1–2	Ref	Ref
3–4	1.26	0.98, 1.62
5–7	1.22	0.83, 1.77
8	1.34	1.06, 1.69
Endoscopy facility in ZIP code		
No	Ref	Ref
Yes	1.19	0.92, 1.53
Percent Medicaid panel age eligible for CRC screening	0.92	0.85, 0.99

Note: Boldface indicates statistical significance ($p < 0.05$).

^a i.e., receipt of any CRC screening within a year after turning aged 50 years, in Hispanic and non-Hispanic white Medicaid enrollees.

CRC, colorectal cancer.

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