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Colonoscopy Quality Measures and Adherence to Follow-up Guidelines Among Endoscopists Participating in a United States Endoscopy Registry

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Abstract

Background and Aims: Colonoscopy screening can substantially reduce colorectal cancer incidence and mortality. Colonoscopies may achieve maximum benefit when they are performed with high quality and accompanied by follow-up recommendations that adhere to clinical guidelines. This study aimed to determine to what extent endoscopists met targets for colonoscopy quality from 2016 through 2019 (the most recent years prior to the COVID-19 pandemic).

Methods: We examined measures of colonoscopy quality and recommended follow-up intervals in the GI Quality Improvement Consortium, a large nationwide endoscopy registry. The analysis included over 2.5 million outpatient screening colonoscopies in average risk adults aged 50–75 years.

Results: At least 90% of endoscopists met performance targets for adequate bowel preparation, cecal intubation rate, and adenoma detection rate. However, nonadherence to guidelines for follow-up intervals was common. For patients with no colonoscopy findings, 12.0% received a follow-up interval recommendation of ≤5 years instead of the guideline-recommended 10 years. For patients with 1–2 small tubular adenomas, 13.5% received a follow-up interval recommendation of ≤3 years instead of the guideline-recommended 5–10 years. For patients with small sessile serrated polyps, 30.7% received a follow-up interval recommendation of ≤3 years instead of the guideline-recommended 5 years. Some patients with higher risk findings received

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a follow-up interval recommendation of ≥5 years instead of the guideline-recommended 3 years, including 18.2% of patients with advanced serrated lesions.

Conclusions: Additional attention may be needed to achieve more consistent adherence to guidelines for colonoscopy follow-up recommendations.

Keywords

colonoscopy; mass screening; early detection of cancer; colorectal neoplasms; quality indicators; guideline adherence

Introduction

The United States Preventive Services Task Force (USPSTF) recommends that adults aged 45–75 years be screened for colorectal cancer (CRC) with colonoscopy or another screening test (1). Screening can substantially reduce CRC incidence and mortality (2). However, the maximum benefit of colonoscopies may be achieved when they are performed with high quality (3–7). In addition, following a colonoscopy, patients may need to be screened and followed up at appropriate intervals (8, 9). The US Multi-Society Task Force on Colorectal Cancer and the American Society for Gastrointestinal Endoscopy (ASGE)/ American College of Gastroenterology (ACG) Task Force on Quality in Endoscopy have defined colonoscopy quality measures for routine monitoring in clinical practice, including adenoma detection rate (ADR), cecal intubation rate, adequacy of bowel preparation quality, and appropriateness of rescreening and surveillance recommendations based on the colonoscopy outcome (3, 8). Recommended target levels for each quality measure have also been set (3).

Prior studies have found that performance on colonoscopy quality measures varies between endoscopists, with some endoscopists not meeting recommended targets. However, there are limited recent data on colonoscopy quality, including appropriateness of recommended follow-up intervals, in the United States. Recent prior studies were conducted in medical centers or practices with relatively small numbers of endoscopists, or in a program that included only adults who were low income, uninsured, or underinsured (10–17).

The goal of this analysis was to determine to what extent endoscopists were meeting performance targets for colonoscopy quality nationally during 2016 through 2019 (the most recent years prior to the COVID-19 pandemic). Identifying the extent to which endoscopists meet performance targets may be important for the development and implementation of colonoscopy quality improvement efforts. Therefore, we conducted an analysis of data from the GI Quality Improvement Consortium (GIQuIC), a large nationwide endoscopy registry designed to facilitate quality monitoring (18).

Methods

Data source

GIQuIC is a national nonprofit endoscopy registry established by the ACG and ASGE (18). Approximately one-third of US gastroenterologists participate in the GIQuIC registry (19).

GIQuIC collects and reports information from endoscopists on quality measures using a standardized data collection tool that captures information entered into a GIQuIC-certified endowriter. For most sites, data was exported from the electronic health record and uploaded to the registry website, but a small percentage of sites (6% during our study time period) entered data manually into data fields when logged on to the registry website. During data entry, GIQuIC produces an error message for procedures with a missing or invalid required data element; the error must be resolved before submission. Warnings are issued indicating that a data element may be incorrect and should be investigated for accuracy. Data managers are trained to address errors and warnings to ensure data are accurate and complete. They are also trained to enter or update the recommended follow-up interval to reflect the interval told to the patient after pathology results were reviewed by the endoscopist. Audits are conducted to evaluate the accuracy of data fields by comparing GIQuIC data to procedure notes and medical records. GIQuIC has been approved as a Qualified Clinical Data Registry by the Centers for Medicare and Medicaid Services (CMS) for reporting to the Merit-based Incentive Payment System program (20). Research using GIQuIC data has been exempted from review by the Western Institutional Review Board.

Study Eligibility Criteria

This study included outpatient colonoscopies conducted for colorectal cancer screening as the only indication between 2016 and 2019 in average risk adults aged 50–75 years. We did not include colonoscopies in adults aged 45–49 years because during the study period the USPSTF did not recommend CRC screening for this age group (21). Colonoscopies conducted for surveillance or diagnostic indications (including colonoscopies after abnormal non-colonoscopic screening tests) or conducted in adults considered to be high risk were not included in the analysis. There is a field on the GIQuIC form for the colorectal neoplasm risk assessment prior to the colonoscopy procedure, which includes options of average risk or high risk. If the endoscopist selected “high risk”, then they were required to select all that apply from a list of high risk categories, including inflammatory bowel disease and personal or family history of: colon or rectal adenocarcinoma, colon adenoma(s), high risk genetic family cancer syndrome, sessile serrated polyp(s), or serrated polyposis syndrome. If the endoscopist selected any of these categories of high risk, then the colonoscopy was excluded from the analysis.

Colonoscopies were considered eligible only if they were conducted by an endoscopist with ≥100 colonoscopies in the GIQuIC dataset that met the inclusion criteria. This eligibility criterion ensured adequate sample size for characterizing quality measures at the endoscopist level, while maintaining consistent data across patient-level and endoscopist-level analyses. If a patient had multiple eligible colonoscopies during the study period, only the first colonoscopy was included. There were 2,588,860 colonoscopy procedures that met these criteria.

There were additional exclusions for some specific quality measures as described below. For each quality measure, colonoscopies were included only if they were conducted by endoscopists who had ≥100 colonoscopies that met the inclusion and exclusion criteria for

that quality measure. For ADR, this minimum criterion was applied for males and females separately.

Colonoscopy Quality Measures

Quality measures examined included cecal intubation rate, adequacy of bowel preparation, ADR, and the endoscopist's recommended follow-up interval to the next colonoscopy. Performance targets for cecal intubation rate, adequacy of bowel preparation, and ADR were based on targets established by ASGE and ACG (3). For cecal intubation rate and adequate bowel preparation, the targets were ≥95% and ≥85%, respectively. The target for ADR was ≥30% for men and ≥20% for women.

Cecal intubation rate was defined as having at least 1 cecal landmark (ileocecal valve, appendiceal orifice, terminal ileum) photographed. Colonoscopies with inadequate bowel preparation were excluded for this measure.

Adequate bowel preparation was defined on the GIQuIC data collection form as "sufficient to accurately detect polyps >5 mm in size." GIQuIC does not specify which bowel preparation scale should be used. The electronic medical record software systems (endowriters) used by endoscopy practices convert scores on bowel preparation scales to the categories of adequate and inadequate for GIQuIC by using predefined conversion criteria. For example, one of the most commonly used endowriters converts Boston Bowel Preparation Scale segment scores of 0 or 1 (or a total score of 5 or less) and qualitative descriptors of "poor" and "fair" to "inadequate". ADR was defined as the percentage of colonoscopies with 1 or more adenomatous polyps or an adenocarcinoma detected. As per GIQuIC protocol, serrated lesions (sessile serrated polyps and traditional serrated adenomas) were not included in the numerator, and if only a serrated lesion was found, that procedure was excluded from the denominator. For ADR, colonoscopies were excluded if there was no photodocumentation of the cecum, if there was inadequate bowel preparation, or if endoscopists were missing pathology for >10% of their colonoscopies where a biopsy or polypectomy was performed. Because the ADR targets are different for men and women, ADR was calculated separately by sex.

For analyses of the follow-up interval recommended by the endoscopist, colonoscopies were excluded if bowel preparation was inadequate, if there was no photodocumentation of the cecum, or if adenocarcinoma was found. These recommended follow-up interval analyses were conducted both at the patient level and endoscopist level. Patient-level analyses estimated the proportion of patients who received follow-up recommendations consistent with guidelines, whereas endoscopist-level analyses estimated the proportion of endoscopists with ≥90% of recommended intervals meeting guidelines. The GIQuIC colonoscopy data collection form provided categories for the follow-up interval for the next colonoscopy. These categories included None, <3 months, 3 months, 6 months, 9 months, 1 year, 2 years, 3 years, 5 years, 10 years, and Other. The results for this measure were stratified by the colonoscopy findings, with the most advanced colonoscopy finding determining whether the recommended follow-up interval was consistent with guidelines. For endoscopist-level analyses of each finding, we included only endoscopists who had ≥100 colonoscopies in the analysis dataset for that finding. Because of data

limitations (e.g., lack of information on size or location of hyperplastic polyps or on exact number of adenomas) and/or small numbers for some findings, we conducted endoscopist-level analyses of recommended follow-up interval only for certain colonoscopy findings. The endoscopist's recommended follow-up interval after colonoscopy was defined as nonadherent for a colonoscopy finding if the recommended interval noted in GIQuIC was not consistent with colonoscopy surveillance guidelines issued by the US Multi-Society Task Force on Colorectal Cancer in 2012, because those were the guidelines in effect during the study time period (8).

Covariates

Patient and procedure characteristics were classified based on categories on the GIQuIC data collection form, as noted in Table 1. Physician sex was determined from the National Provider Identifier (NPI) database (22). Physician specialty was categorized as gastroenterology or other specialty using taxonomy codes from the NPI database. For geographic region of the endoscopist, the endoscopist was assigned the region where they performed the majority of colonoscopies.

Statistical analysis

Descriptive statistics and 95% confidence intervals were calculated for quality measures. For comparisons of quality measures by endoscopist specialty, endoscopist sex, and region, chi-square tests for heterogeneity across categories were conducted and were considered statistically significant if $P < 0.05$. Analyses of the follow-up interval recommended by the endoscopist were conducted at both the patient and endoscopist level. All other analyses were performed only at the endoscopist level. All analyses were performed using SAS v9.4 (SAS Institute Inc, Cary, NC).

Results

Characteristics of Study Population

Table 1 shows characteristics of the patients, colonoscopies, and endoscopists in the overall study population. Race and ethnicity were unknown for a substantial proportion of patients (25.4% and 41.9%, respectively). Most (79.9%) colonoscopies were performed in an ambulatory surgery or endoscopy center. The majority of endoscopists were male (83.8%) and were gastroenterologists (88.5%).

Results for Quality Measures Overall and By Endoscopist Characteristics

At least 90% of endoscopists met performance targets for adequate bowel preparation, cecal intubation rate, and ADR in male and female patients (Table 2). The percent of endoscopists who met the target for ADR and cecal intubation rate was slightly higher for gastroenterologists (between 90.5% and 91.8% depending on the measure) as compared with other specialties (between 83.6 and 86.6%), and ADR was slightly higher for female endoscopists (between 92.7% and 94.8%) than male endoscopists (between 89.5% and 90.8%). For ADR, the percent of endoscopists who met the target was lowest (83.5% for male patients, 84.3% for female patients) in the Northeast region. For adequate bowel

preparation, the percent of endoscopists meeting the target was lowest in the Northeast (89.9%) and Midwest (91.4%) and highest in the West (97.2%).

Adenoma Detection Rates

Figures 1 and 2 present the ADR distribution for male and female patients separately. For female patients, 90.0% of endoscopists met the target ADR of 20%, and 26.2% of endoscopists had an ADR ≥40%. For male patients, 91.3% of endoscopists met the target ADR of 30%, and 71.0% of endoscopists had an ADR ≥40%.

We also conducted a sensitivity analysis for ADR with different inclusion criteria. When we calculated ADR including colonoscopies with inadequate bowel preparation or no photodocumentation of the cecum, the results were very similar (differences of <1 percentage point) (data not shown).

Recommended Follow-up Interval

Table 3 presents patient-level data on the follow-up interval recommended by the endoscopist. Nonadherence to follow-up intervals recommended by guidelines was common, most often due to endoscopists recommending a follow-up interval shorter than recommended by guidelines. The percentage of patients receiving a follow-up recommendation shorter than recommended by guidelines differed by colonoscopy findings. For colonoscopies with no findings, 12.0% of recommendations were for a shorter follow-interval than the 10 years recommended in guidelines. For colonoscopies with findings of 1–2 small tubular adenomas, 13.5% of recommendations were for a shorter follow-up interval than the 5–10 years recommended in guidelines. The percentage of patients receiving a follow-up recommendation shorter than recommended by guidelines was highest for small sessile serrated polyps without dysplasia (30.7% for a shorter follow-up interval than the 5 years recommended in guidelines) and advanced serrated lesions and advanced adenomas (16.2% and 22.9% of recommendations, respectively, for a shorter follow-up interval than the 3 years recommended in guidelines). However, some patients with higher risk findings received a follow-up interval recommendation longer than the 3 years recommended in guidelines, including 18.2% of patients with advanced serrated lesions and 6.3% of patients with advanced adenomas.

Recommendations of “none” for the follow-up interval were more common in patients aged 66–75 than in patients aged 50–65, particularly if there were no colonoscopy findings or findings of only hyperplastic polyps (Supplementary Tables 1 and 2).

We also examined the percentage of endoscopists following guidelines for the recommended follow-up interval after colonoscopy (Table 4). The percent of endoscopists who met the target of ≥90% of their recommended follow-up intervals meeting guidelines was 64.7% for no colonoscopy finding and 59.1% for 1–2 small tubular adenomas. The percent of endoscopists who met the target was particularly low for findings of small sessile serrated polyps without dysplasia or for advanced adenomas (approximately 15%). While the percent of endoscopists who met the target of 90% adherence to guidelines for these findings was fairly low, most endoscopists (from 82 to 94%, depending on the finding) adhered to guidelines at least half of the time (data not shown).

Discussion

In this analysis of data from a large nationwide endoscopy database, approximately 90% of endoscopists met recommended targets for ADR, adequate bowel preparation quality, and cecal intubation. However, endoscopists often recommended shorter follow-up intervals than those recommended by clinical guidelines.

Our finding that endoscopists often recommended a follow-up colonoscopy sooner than recommended by guidelines is generally consistent with findings from earlier US studies. A previous study of approximately 20,000 colonoscopies performed through CDC's Colorectal Cancer Control Program (CRCCP) from 2009 to 2015 found results generally similar to ours for the recommended follow-up interval after normal colonoscopies or colonoscopies with findings of hyperplastic polyps, 1–2 small tubular adenomas, or advanced adenomas (16). However, the CRCCP included only adults who were low income, underinsured, or uninsured; moreover, the CRCCP reported a small number of colonoscopies with findings of serrated lesions, limiting its ability to describe adherence to follow-up guidelines after these lesions (16). Other recent US studies of endoscopists' recommended follow-up intervals have yielded mixed results, but each study included fewer than 2000 colonoscopies from a limited number of clinical sites (13–15, 23).

There are several potential reasons why endoscopists may recommend follow-up intervals that are shorter or longer than recommended by guidelines. The particularly high nonadherence to guidelines for serrated polyps in our study may be partially explained by the low quality of evidence available to support the recommended follow-up interval for these lesions (8, 9). However, the quality of evidence available for most other recommended follow-up intervals is moderate or high (8, 9, 23). Nonadherence to guidelines may be partially due to lack of awareness of guidelines, but some endoscopists may not agree with guidelines and may think they are too aggressive or not aggressive enough (24, 25). In addition, some endoscopists may recommend shorter follow-up intervals due to piecemeal resection of lesions, concern that lesions were missed or that interval cancer may develop, or fear of medical malpractice litigation (26–28).

Our finding that endoscopists often recommend follow-up surveillance intervals that are too short has potential implications. Follow-up surveillance intervals that are too short can unnecessarily increase the risk of complications and increase costs and burden on the healthcare system (29–31). While recommending follow-up intervals longer than those recommended by guidelines occurred less often in our study, it was not uncommon after higher-risk lesions (advanced adenomas, advanced serrated lesions, or 3 or more adenomas). Follow-up surveillance intervals that are too long may increase the risk of development of interval CRC (9). Education on evidence supporting the guidelines may help increase guideline adherence (23). Electronic health record-based clinical decision support tools may also increase guideline adherence (14).

We found that recommendations of "none" for follow-up interval were more common in patients aged 66–75 than in younger patients, particularly if there were no colonoscopy findings or findings of only hyperplastic polyps. For some older patients, a recommendation

for no additional screening or surveillance might be considered appropriate in certain circumstances (32). For CRC screening, the USPSTF recommends that clinicians selectively offer screening for adults aged 76 to 85 years, taking into consideration the patient's overall health, prior screening history, and preferences (1). US guidelines for when to stop surveillance are unclear. The 2012 US Multi-Society Task Force on Colorectal Cancer stated that "the decision to continue surveillance should be individualized, based on an assessment of benefit, risk, and comorbidities" (8).

For this analysis, we used the colonoscopy surveillance guidelines issued by the US Multi-Society Task Force on Colorectal Cancer in 2012 (8) to define recommended follow-up intervals as nonadherent, because those guidelines were in effect during the study period. These guidelines were updated in 2020 (9), and include an increase in some recommended surveillance intervals (e.g., after removing 1 or 2 small tubular adenomas, the recommendations changed from 5–10 years to 7–10 years) (9). Future studies could investigate whether adherence to surveillance guidelines has improved over time, especially following the updating of the guidelines in 2020.

The performance target of 95% for cecal intubation with photodocumentation was met by 90% of endoscopists in this study. For adequate bowel preparation, 93% of endoscopists met the performance target of 85% of their patients having adequate bowel preparation. Several other smaller studies in academic health systems and CDC's Colorectal Cancer Control Program reported high cecal intubation rates and high rates of adequate bowel preparation, although they did not report the percentage of endoscopists who met the target for these quality measures (10, 12, 16, 33). The risk of post-colonoscopy CRC is increased for colonoscopies without adequate bowel preparation or that do not reach the cecum (34, 35). Some factors that may improve bowel preparation quality include split-dose bowel preparation, simple bowel preparation instructions at a low literacy level and available in multiple languages, and patient navigation (36–39).

For ADR, about 90% of endoscopists met the performance target, but a substantial number of endoscopists did not meet the target. Patients of endoscopists with higher ADRs have been found to have lower risks of post-colonoscopy CRC and cancer death (5–7). Other studies in smaller populations found that most endoscopists met the ADR target (12, 40, 41). Educational programs and regular monitoring of endoscopist ADRs with feedback to endoscopists may improve ADR (42–44).

Similar to results from some previous studies (10, 11, 45), we found that gastroenterologists were significantly more likely to meet performance targets for ADR and cecal intubation than other endoscopists. We also found that female endoscopists were more likely to meet performance targets for ADR than male endoscopists. We were unable to adjust for factors such as years in practice or endoscopist age due to data limitations. Previous study results have been inconsistent about the relationship between sex of the endoscopist and ADR (11, 12, 41).

Endoscopists in this study, which includes data from 2016–2019, were predominantly male (83.8%), consistent with 2017 data from the Association of American Medical Colleges in

which 82.4% of all gastroenterologists were male (46). The percentage of endoscopists who are female may have increased since the time period of our study.

We also found that the percent of endoscopists that met the performance targets varied by region, particularly for adequate bowel preparation and ADR. For ADR, the percent of endoscopists meeting the target was lowest in the Northeast. For adequate bowel preparation, the percent of endoscopists meeting the target was lowest in the Northeast and Midwest and highest in the West. Reasons for these regional differences are unknown and could be due to differences in patient or endoscopist characteristics.

Strengths of our study include the use of data from a national endoscopy database with a large sample size and a variety of types of practices across the United States. Our study included more than 2.5 million colonoscopies and more than 3700 endoscopists. Study limitations include the fact that only about one-third of US gastroenterologists participate in the GIQuIC registry (19). Poor performing endoscopists may be underrepresented in the GIQuIC database, so our results may overestimate colonoscopy quality in the United States. Potential generalizability could be improved by broadening participation in GiQuIC. In addition, our assessment of cecal intubation included colonoscopies where ileocecal valve photodocumentation alone was considered adequate, although this may overestimate advancement proximal to the valve where the cecal caput can be fully examined. Another limitation is the large percentage of missing data on patient race and ethnicity, limiting our ability to analyze data by race or ethnicity. We also did not have information on the size or location of hyperplastic polyps, the exact number of adenomas and serrated lesions, and whether there was partial or piecemeal resection of polyps. In addition, since this was a cross-sectional retrospective analysis, we did not have any information on when patients returned for follow-up colonoscopies.

In summary, this large nationwide study found that most endoscopists met recommended targets for ADR, adequate bowel preparation quality, and cecal intubation. However, a substantial number of endoscopists did not meet recommended targets. Nonadherence to guidelines for follow-up interval recommendations was common, with endoscopists often recommending shorter follow-up intervals. Additional studies supporting recommended follow-up intervals for serrated polyps may help increase adherence to guidelines (23). Recommended strategies to improve colonoscopy quality include measuring and providing feedback on quality measures at the endoscopist level and educational programs for endoscopists (4, 23, 47–49). Increasing the number of endoscopists who are meeting quality targets can help ensure that more patients receive the full benefit of colonoscopy.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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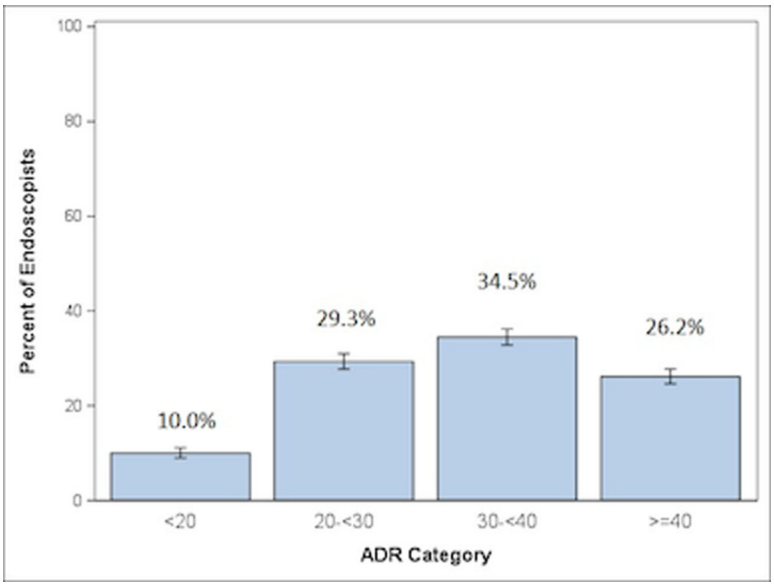

Figure 1.

Adenoma detection rates (ADRs) for female patients. Error bars are 95% confidence intervals. Target for ADR is ≥20% for female patients.

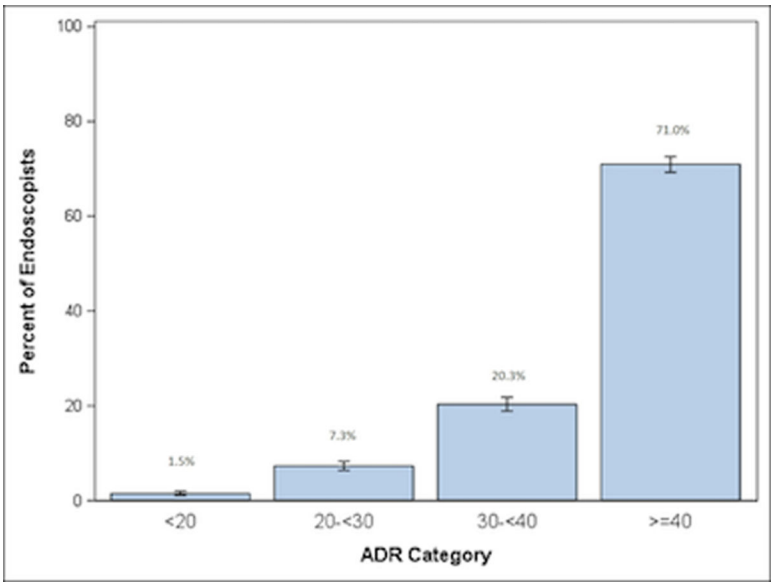

Figure 2.

Adenoma detection rates (ADRs) for male patients. Error bars are 95% confidence intervals. Target for ADR is ≥30% for male patients.

Table 1.

Characteristics of patients, colonoscopies, and endoscopists[a]

	N	%
Characteristics of Patients/Colonoscopies (N = 2,588,860)		
Age (years)		
50–59	1,416,894	54.7
60–69	934,302	36.1
70–75	237,664	9.2
Sex		
Male	1,203,444	46.5
Female	1,385,416	53.5
Race		
Asian	83,059	3.2
Black or African American	232,301	9.0
White	1,517,132	58.6
Other	99,673	3.9
Unknown	656,695	25.4
Ethnicity		
Hispanic or Latino	143,433	5.5
Not Hispanic or Latino	1,361,967	52.6
Unknown/Declined	1,083,460	41.9
Year of colonoscopy		
2016	546,338	21.1
2017	657,818	25.4
2018	689,414	26.6
2019	695,290	26.9
Endoscopy suite type		
Hospital	297,741	11.5
Ambulatory surgery/endoscopy center	2,068,702	79.9
Physician office	70,871	2.7
Unknown	151,546	5.9
Characteristics of Endoscopists (N = 3,735)		
Sex of endoscopist		
Male	3128	83.8
Female	607	16.3
Gastroenterology specialty		
Yes	3305	88.5
No	430	11.5
Region		
Northeast	834	22.3
Midwest	572	15.3
South	1570	42.0
West	759	20.3

[a]Includes first outpatient screening colonoscopy in 2016–2019 for average risk patients aged 50–75 years. Colonoscopies are included only if they were performed by an endoscopist with ≥100 eligible colonoscopies in the analysis dataset.

Table 2.

Percent of endoscopists that met targets for quality measures, overall and by endoscopist characteristics

	Percent of Endoscopists that Met Target[a] for Quality Measure			
	Cecal Intubation (N = 3687)[b]	**Adequate Bowel Preparation (N = 3735)[b]**	**ADR in Men (N = 2865)[b]**	**ADR in Women (N = 3027)[b]**
Endoscopist Characteristic				
All endoscopists	90.0% (89.0 – 90.9)	93.2% (92.3 – 93.9)	91.3% (90.2 – 92.3)	90.0% (88.9 – 91.0)
Gastroenterology specialty				
Yes	90.5% (89.4 – 91.4)	93.0% (92.1 – 93.8)	91.8% (90.7 – 92.8)	90.7% (89.5 – 91.7)
No	86.2% (82.6 – 89.2)	94.4% (91.8 – 96.2)	86.6% (82.1 – 90.2)	83.6% (79.0 – 87.4)
P value[c]	*0.007*	*0.28*	*0.004*	*0.0001*
Sex of endoscopist				
Male	89.6% (88.4 – 90.6)	93.2% (92.3 – 94.1)	90.8% (89.6 – 91.9)	89.5% (88.2 – 90.6)
Female	92.1% (89.7 – 94.0)	92.9% (90.6 – 94.7)	94.8% (91.9 – 96.7)	92.7% (90.1 – 94.6)
P value[c]	*0.06*	*0.78*	*0.01*	*0.03*
Region				
Northeast	92.4% (90.3 – 94.0)	89.9% (87.7 – 91.8)	83.5% (80.4 – 86.2)	84.3% (81.4 – 86.9)
Midwest	90.2% (87.5 – 92.4)	91.4% (88.9 – 93.5)	94.7% (92.1 – 96.5)	92.1% (89.1 – 94.2)
South	88.4% (86.7 – 89.9)	93.6% (92.3 – 94.7)	92.8% (91.2 – 94.1)	91.1% (89.4 – 92.5)
West	90.4% (88.1 – 92.3)	97.2% (95.8 – 98.2)	94.0% (91.7 – 95.6)	92.4% (90.1 – 94.2)
P value[c]	*0.02*	*<0.0001*	*<0.0001*	*<0.0001*

[a] Targets for quality measures: ADR in men: ≥30%; ADR in women: ≥20%; cecal intubation: ≥95%; adequate bowel preparation: ≥85%.

[b] N = number of endoscopists in the analysis for this quality measure. For each quality measure, endoscopists were included only if they had at least 100 colonoscopies in the dataset that met inclusion criteria for the quality measure.

[c] *P* value for heterogeneity across categories calculated using chi-square test.

ADR, adenoma detection rate.

Table 3.

Recommended follow-up interval after colonoscopy, by colonoscopy finding[a]

Most advanced finding	Total N	Endoscopist's recommended interval to next colonoscopy, N (%) of patients						
	2,194,115	≤1 year	2 years	3 years	5 years	10 years	Other	None
No findings[b]	984,093	2592 (0.3)	400 (0.0)	3470 (0.4)	111,555 (11.3)	825,244 (83.9)	11,914 (1.2)	28,918 (2.9)
Hyperplastic polyps[c]	264,437	1429 (0.5)	418 (0.2)	11,930 (4.5)	80,330 (30.4)	156,423 (59.2)	9475 (3.6)	4432 (1.7)
1–2 tubular adenomas <10 mm	565,063	6297 (1.1)	2062 (0.4)	67,739 (12.0)	464,657 (82.2)	5403 (1.0)	16,159 (2.9)	2746 (0.5)
Sessile serrated polyp <10 mm without dysplasia	101,896	2555 (2.5)	988 (1.0)	27,690 (27.2)	67,298 (66.1)	558 (0.6)	2487 (2.4)	320 (0.3)
≥3 adenomas[d]	117,524	6503 (5.5)	2074 (1.8)	93,959 (80.0)	12,246 (10.4)	101 (0.1)	2378 (2.0)	263 (0.2)
Advanced serrated lesion[e]	34,424	4665 (13.6)	894 (2.6)	21,630 (62.8)	6168 (17.9)	89 (0.3)	896 (2.6)	82 (0.2)
Advanced adenoma[f]	126,678	25,350 (20.0)	3730 (2.9)	86,741 (68.5)	7829 (6.2)	87 (0.1)	2755 (2.2)	186 (0.2)

[a]This table presents patient-level data on the endoscopist's recommended follow-up interval to the next colonoscopy. Shaded cells in table are the recommended follow-up intervals according to the 2012 US Multi-Society Task Force (8) unless noted below. The 2012 recommendations were used since they were in place during the study period of 2016–2019.

[b]If there were "no findings" on the colonoscopy, a recommendation of "none" for follow-up interval may meet guidelines for some patients aged 66–75 years, since the US Preventive Services Task Force recommends that clinicians only selectively offer colorectal cancer screening in adults aged 76–85 years (2).

[c]The follow-up interval recommended by the 2012 US Multi-Society Task Force for hyperplastic polyps is 10 years if <10 mm and in the rectum or sigmoid (8), but the GIQuIC database did not contain information on the size or location of hyperplastic polyps. Since experts have suggested a 5-year interval may be appropriate for proximal hyperplastic polyps (50), an interval of 5 years is also shaded to indicate this interval may meet recommendations.

[d]The follow-up interval recommended by the 2012 US Multi-Society Task Force is 3 years for 3–10 adenomas but <3 years if >10 adenomas (8). The GIQuIC database did not contain information on the exact number of adenomas.

[e]Advanced serrated lesions: sessile serrated polyp (SSP) ≥10 mm, SSP with dysplasia, or traditional serrated adenoma.

[f]Advanced adenoma: ≥10 mm, high-grade dysplasia, or villous component.

GIQuIC, GI Quality Improvement Consortium.

Table 4.

Percent of endoscopists following guidelines for recommended follow-up interval after colonoscopy, by colonoscopy finding

Follow-Up Interval Recommended by Guidelines for Specific Colonoscopy Finding[a]	Number of Endoscopists in Analysis [b]	% (95% CI) of Endoscopists Who Met Target (≥90% Adherence to Guidelines)[c]
10 years after no colonoscopy finding[d]	2638	64.7% (62.8 – 66.5)
5–10 years after 1–2 tubular adenomas <10 mm [e]	2074	59.1% (57.0 – 61.2)
5 years after sessile serrated polyp <10 mm without dysplasia [e]	157	14.7% (10.0 – 21.0)
3 years after advanced adenoma[e,f]	214	14.5% (10.4 – 19.8)

[a] Recommended follow-up intervals according to the 2012 US Multi-Society Task Force guidelines (8).

[b] For each finding, only endoscopists with at least 100 colonoscopies in the dataset with that finding were included in the analysis.

[c] Endoscopists were considered to have met the target if ≥90% of the follow-up intervals they recommended were consistent with guidelines. Colonoscopies were excluded if a follow-up interval of "other" was recommended by the endoscopist.

[d] For colonoscopies with no findings, a recommended follow-up interval of "none" was included as meeting guidelines for patients aged 66–75 years, since the US Preventive Services Task Force (USPSTF) recommends that clinicians only selectively offer screening for colorectal cancer in adults aged 76–85 years (2).

[e] Excluded a small number of colonoscopies with a recommended follow-up interval of "none," since guidelines are unclear.

[f] Advanced adenoma: ≥10 mm, high-grade dysplasia, or villous component.