HHS Public Access

Author manuscript

Gastrointest Endosc. Author manuscript; available in PMC 2018 June 01.

Published in final edited form as:

Gastrointest Endosc. 2017 June ; 85(6): 1188–1194. doi:10.1016/j.gie.2017.01.020.

Providing data for serrated polyp detection rate benchmarks: an analysis of the New Hampshire Colonoscopy Registry

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Abstract

Background and Aims—Similar to achieving adenoma detection rate (ADR) benchmarks to prevent colorectal cancer (CRC), achieving adequate serrated polyp detection rates (SDR) may be essential to the prevention of CRC associated with the serrated pathway. Previous studies have been based on data from high-volume endoscopists at single academic centers. Based on a hypothesis that ADR is correlated with SDR, we stratified a large, diverse group of endoscopists (n=77 practicing at 28 centers) into high and low performers based on ADR, to provide data for corresponding target SDR benchmarks.

Methods—Using colonoscopies in adults ≥ 50 years (4/09–12/14), we stratified endoscopists by high and low ADR (< 15%,15% to <25%,25% to <35%, ≥35%), to determine corresponding SDRs, using two SDR measures, for screening and surveillance colonoscopies separately: (1) *Clinically significant* SDR (CSSDR) = colonoscopies with any SSA/P, TSA, HP >1 cm anywhere

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The contents of this work do not represent the views of the Department of Veterans Affairs or the United States Government

Conflict of interests: The authors have no conflicts of interest to declare.

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Analysis and interpretation of the data Anderson, Joseph C.; Weiss, Julia E.; Robinson, Christina M.; Butterly, Lynn

Drafting of article Anderson, Joseph C.; Weiss, Julia E.; Robinson, Christina M.; Butterly, Lynn

Critical revision of the article for important intellectual content; Anderson, Joseph C.; Weiss, Julia E.; Robinson, Christina M.; Butterly, Lynn

Final approval of the article Anderson, Joseph C.; Weiss, Julia E.; Robinson, Christina M.; Butterly, Lynn

in the colon or HP > 5 mm in the proximal colon only ÷ by total screening and surveillance colonoscopies, respectively. (2) *Proximal* SDR (PSDR) = colonoscopies with any serrated polyp (SSA/P, HP, TSA) of any size proximal to the sigmoid ÷ by total screening and surveillance colonoscopies, respectively.

Results—A total of 45,996 (29,960 screening) colonoscopies by 77 endoscopists (28 facilities) were included. Moderately strong positive correlation coefficients were observed for screening ADR/CSSDR (ρ=0.69) and ADR/PSDR (ρ=0.79) and a strong positive correlation (ρ=0.82) for CSSDR/PSDR ($p<0.0001$ for all). For ADR ≥25%, endoscopists' median (IQR) screening CSSDR was 6.8% (4.3%–8.6%) and PSDR was 10.8% (8.6% –16.1%).

Conclusion—Derived from ADR, the primary colonoscopy quality indicator, our results suggest potential SDR benchmarks (CSSDR=7% and PSDR=11%) that may guide adequate serrated polyp detection. Because CSSDR and PSDR are strongly correlated, endoscopists could use the simpler PSDR calculation to assess quality.

Keywords

Adenoma detection; serrated polyp; colonoscopy

Introduction

Serrated polyps are an important focus of colorectal cancer (CRC) screening because the associated pathway may account for up to 30% of all CRC[1]. Subsets of serrated polyps share molecular and epidemiological features with interval cancers, i.e., tumors diagnosed within 3 to 5 years of colonoscopy[2, 3]. Furthermore, serrated polyps, which include sessile serrated adenomas/polyps (SSA/P), traditional serrated adenomas (TSA), and hyperplastic polyps (HP), are common, detected in 9% to 21% of patients presenting for screening colonoscopy[4–9]. Serrated polyps, particularly SSA/Ps, can be difficult to detect given their flat morphology and indistinct borders[1]. This may contribute to the observed significant variation in proximal serrated polyp detection rates (PSDR) among endoscopists[6–8]. The importance of serrated polyp detection and the variation in detection rates among endoscopists suggest the need for a benchmark rate, similar to ADR, for detection rates of serrated polyps (SDR), particularly for large or proximal serrated polyps or SSA/P, which have malignant potential. However, unlike adenoma detection rate (ADR) for potentially precancerous adenomas, a benchmark serrated detection rate (SDR) has not yet been established.

A realistic benchmark range should be derived from a diverse population of endoscopists rather than a small group of high-volume individuals. Similar to investigations for ADR[10], further examination into "higher performing endoscopists" may also provide information about optimal serrated polyp detection rates (SDRs). Studies performed at single academic centers showed a correlation between an endoscopist's ADR and proximal SDR[7, 8]. One method to determine target SDRs might involve assessing SDRs for endoscopists with high and low ADRs, respectively. This approach would rely on the intuitively reasonable assumption that endoscopists whose techniques result in high ADRs might similarly achieve high SDRs. If demonstrated to be a reasonable assumption through strong correlation of

ADR and SDR results, then SDRs for high- and low-performing endoscopists (based on ADR) could inform a benchmark range for SDR, with the former providing an optimal target benchmark.

One important consideration when establishing benchmark rates is whether to include data from surveillance in addition to screening examinations. Providing evidence to set benchmark targets for quality indicators is critically important in guiding consistent quality within screening programs, as has been demonstrated for the use of benchmark ADRs. ADR benchmarks were determined based on screening populations[11–13]. However, some clinicians and a few published studies have assessed ADR based on screening and surveillance patients combined. To investigate the validity of this practice, the New Hampshire Colonoscopy Registry (NHCR) investigated ADRs within screening and surveillance populations respectively, and published results indicating a statistically significant difference between the screening and surveillance for ADR, although not for SDR[4]. Additional evidence will further clarify this issue; therefore, data for SDR benchmarks should be presented separately by screening and surveillance indications.

Estimating SDR benchmarks requires refining the definitions of which lesions to include within the category of SDR, based on their ability to be CRC precursors. Using the comprehensive data from the New Hampshire Colonoscopy Registry (NHCR)[4, 5, 14–17], together with suggested criteria from an expert panel[1], we calculated 2 SDRs for each NHCR endoscopist. One rate was based on factors that may be predictive of *clinically significant serrated polyps,* including size, location, and histology that differentiated the subtypes of serrated polyps. This clinically significant serrated polyp detection rate (CSSDR) included any SSA/P, TSA, and any HP >1 cm anywhere in the colon or any HP >5 mm in the proximal colon only. The other SDR assessment, proximal serrated detection rate (PSDR), was based on the detection of *any serrated polyp proximal to the sigmoid* (also separately assessed based on serrated polyps proximal to the splenic flexure), regardless of size or histological subtype. Although CSSDR includes clinically important serrated polyps, PSDR may be easier for endoscopists to calculate because it relies simply on location and does not require polyp size, or histology for polyps in distal colon, to assist in differentiating between non pre-cancerous HP and possible SSA/P.

The key objective of our analysis was to present the NHCR endoscopists' median and interquartile range (IQR) of SDRs stratified by the endoscopist's ADR, providing evidence toward establishing these important SDR benchmarks. Furthermore, we examined the correlation between the Clinically Significant Serrated Polyp Detection Rate (CSSDR) and the Proximal Serrated Polyp Detection Rate (PSDR) described above, to determine if the simpler measure of PSDR might be sufficient as a quality measure.

Methods

The NHCR is a population-based, statewide registry collecting data from endoscopy sites throughout New Hampshire[14,15,17,18,]. All data collection, study procedures, and informed consent forms were approved by the Committee for the Protection of Human Subjects at Dartmouth College (study no. 00015834), as well as by other relevant human subjects

reviewing bodies at participating sites. Before colonoscopy, patients provide informed consent and complete a self-administered patient questionnaire. Immediately after the colonoscopy, the NHCR procedure form is completed by endoscopists or endoscopy nurses. Data collected include indication (detailed options within screening, surveillance, or diagnostic categories), findings (location and size of polyps or other lesions), quality of bowel preparation, completion of examination, and withdrawal time. For all findings, the NHCR requests reports directly from the pathology laboratory used by each participating endoscopy facility. Trained NHCR staff verify and enter the pathology results into the NHCR database, linking pathology to individual polyps from the procedure form.[14]

Cohort

Our analysis included only those colonoscopies with an indication of either screening or surveillance. Surveillance colonoscopies for familial adenomatous polyposis or hereditary non-polyposis colon cancer, inflammatory bowel disease (IBD) as well as all diagnostic colonoscopies (e.g. for anemia, bleeding or diarrhea) were excluded from this analysis. The study sample included colonoscopies between April 2009 and December 2014 in participants ≥50 years for which pathology reports had been received and abstracted, and which were performed by endoscopists with at least 100 colonoscopies in the NHCR database (N = 47,362 colonoscopies). Colonoscopies with poor bowel preparation (N = 906), or that were incomplete (N = 460) were excluded, leaving 45,996 colonoscopies.

Definitions and Outcome Measures

Indication for examination—On the NHCR procedure form, an indication of screening is offered for colonoscopies performed on asymptomatic individuals both with and without a family history of polyps or CRC. A surveillance indication is specified for participants with a personal history of polyps or CRC. All serrated detection rates were calculated separately by examination indication.

Adenoma detection rates (ADR)—We calculated each endoscopist's ADR (the number of colonoscopies with at least one adenoma or adenocarcinoma detected, divided by the total number of colonoscopies) separately for screening and surveillance colonoscopies[4]. The numerator was defined as colonoscopies with at least one lesion with adenomatous tissue detected, including tubular, tubulovillous or villous adenomas, and adenomatous polyps with high-grade dysplasia, intra-mucosal carcinoma or invasive adenocarcinoma. The denominator included the total number of screening or surveillance colonoscopies, respectively, performed by the endoscopist during the specified time period.

Clinically significant serrated polyp detection rates (CSSDR)—SDRs were also assessed for screening versus surveillance examinations. The numerator equaled the number of colonoscopies with at least one clinically significant serrated polyp, which we defined (based on guideline suggestions[19] and expert opinion[1]) as any SSA/P, TSA, HP ≥1 cm anywhere in the colon or any HP ≥5 mm and proximal to the sigmoid. The denominator was the total number of screening or surveillance colonoscopies, respectively, performed by the endoscopist during the specified time period.

Proximal serrated polyp detection rates (PSDR) and PSDR-SF (proximal to the splenic flexure)—The numerator was the number of colonoscopies with any serrated polyp (SSA/P, TSA, or HP of any size that was proximal to the sigmoid colon). Because some previous studies have used the splenic flexure to divide the proximal and distal colon[7, 8], a separate calculation was determined for those same lesions proximal to the splenic flexure (any serrated polyp in the transverse colon, ascending colon, and cecum). The denominator was the same as the above calculations.

Analysis

Frequency distributions of endoscopist's age, gender, specialty and median withdrawal time in normal colonoscopies (NWT) by ADR groups (< 15%, 15% to < 25%, 25% to < 35% and ≥ 35%) are presented. We computed the endoscopists' median and interquartile range (IQR) for the two serrated polyp detection rates of CSSDR and PSDR, overall and by indication (screening and surveillance) and ADR groups. Both SDRs were evaluated among endoscopists with overall screening ADR ≥25%, and separately among endoscopists with screening ADR-specific rates of ≥30% and ≥20% for males and females, respectively. Based on previous studies,[7, 8] we also examined screening PSDR-SF which used the splenic flexure as the cutoff. We calculated the corresponding screening PSDR-SF for an ADR of 25% and 35%. Non-parametric Spearman correlations coefficients between screening PSDR, CSSDR and ADR and screening PSDR-SF were calculated. The analyses were conducted in SAS (SAS Institute Inc. 2015. SAS 9.4 System Options: Reference, Fourth Edition. Cary, NC: SAS Institute Inc.).

Results

A total of 45,996 colonoscopies (29,960 [65.1%] screening; 16,036 [34.9%] surveillance), were performed by 77 endoscopists at 28 facilities. Overall, the median (IQR) patient age was 59 (53 – 66) years and 47.5% were male. Among the 77 endoscopists, the median (IQR) age was 50 (43 – 58) years, 66 (85.7%) were male, and 51 (68.9%) were gastroenterologists, followed by 21 (23.4%) surgeons and 2 (2.7%) internists. 43 (56.6%) endoscopists had a median normal withdrawal time (NWT) of <9 minutes[14]. Endoscopists with screening ADR <15% were older (ages ≥50 years; 73.3%), more likely to be surgeons (66.7%), and have an NWT <9 minutes (86.7%) compared to endoscopists with an ADR ≥35%, who were younger (ages <50 years, 87.5%), more likely to be gastroenterologists (87.5%), and more frequently had an NWT ≥9 minutes (88.9%; chi-square p-values (p): age (0.02), specialty (0.003), NWT (0.004); Table 1).

There were 2,672 (5.8%) colonoscopies with at least one clinically significant serrated polyp (1,574 screening; 1,098 surveillance) and 4,879 (10.6%) colonoscopies with at least one proximal serrated polyp (2,829 screening; 2,050 surveillance).

Positive and moderately strong correlation coefficients of $\rho = 0.69$ for screening ADR/CSSDR and $\rho = 0.79$ for screening ADR/PSDR were found, with a strong correlation of $\rho = 0.82$ between CSSDR/PSDR found ($p < 0.0001$ for all three; data not shown). The correlation coefficients for PSDR-SF and other screening rates were $\rho = 0.97$ for PSDR/PSDR-SF, $\rho = 0.84$ for CSSDR/PSDR-SF and $\rho = 0.77$ for ADR/PSDR-SF ($p < 0.0001$ for

all three; data not shown). The correlation coefficients for surveillance rates were $\rho = 0.74$ for ADR/CSSDR, $\rho = 0.78$ for ADR/PSDR and $\rho = 0.81$ for CSSDR/PSDR ($p < 0.0001$ for all 3; data not shown).

Table 2 presents the median (IQR) serrated polyp detection rates (SDR) by indication for examination and ADR group. The median (IQR) for PSDR among endoscopists with an ADR ≥35% was 16.2% (15.9% – 23.6%) versus the PSDR for those with ADR <15%, which was 2.5% (1.1% – 3.1%).

Of the endoscopists achieving an ADR of at least 25%, the median (IQR) screening SDRs were 6.8% (4.3% – 8.6%) for CSSDR and 10.8% (8.6% – 16.1%) for PSDR (Table 3). Similar but slightly increased differences in median (IQR) CSSDR and PSDR were found for the gender-specific ADRs (Table 3). The PSDR-SF for corresponding ADR of 25% and 35 % are shown in Table 3.

Discussion

Protection from CRC is derived from the detection and removal of potentially precancerous polyps, including adenomas and a subset of serrated polyps. Setting appropriate benchmarks for serrated polyp detection rates can guide endoscopists toward high quality appropriate practice. Clinical studies have demonstrated that the ADR of 20%, previously proposed as a benchmark[12], is protective from interval cancer risk[20, 21]. A recent joint ACG/ASGE recommendation has suggested an ADR benchmark of 25% (for men and women combined) [13] for screening colonoscopy. A corresponding SDR benchmark has not been recommended, due to insufficient data. To provide evidence for SDR benchmarks, we stratified NHCR endoscopists into ADR-based groups representing high and low ADRs, respectively, for the purpose of calculating the median (IQR) serrated polyp detection rates (SDR) for each ADR group. These ADR groups enabled us to calculate and compare SDRs of higher performing endoscopists with high ADRs to those with lower ADRs. Because an ideal SDR should emphasize the detection of those serrated lesions with malignant potential, we calculated an SDR that included clinically significant serrated polyps (CSSDR). We also used proximal serrated polyps (PSDR) to provide a more practical approach.

When using the ACG/ASGE recommended ADR cutoff of 25%[13], we observed a median screening CSSDR of 6.8% and a median screening PSDR of 10.8% for this group of endoscopists. An analysis from an integrated healthcare delivery organization observed that the lowest risk for interval cancer was associated with endoscopists who had an ADR of 33.5% or higher[20]. Using a screening ADR cutoff of 35%, we observed a median CSSDR of 10.0% and a median PSDR of 16.2%. These SDRs at ADR cutoffs of 25% or 35% provide potential benchmark rates for endoscopists (Table 3).

Given the challenges of incorporating size as well as histology in data collection for CSSDR, this rate may not be as simple to calculate as PSDR, which would be easier for endoscopists to derive. Supporting the use of PSDR, a recent study from the Netherlands observed a significant correlation between proximal (to the splenic flexure) serrated polyp detection rate and “clinically relevant serrated polyps” which the authors defined as serrated

polyps proximal to the rectosigmoid colon or those HPs >5 mm in the rectosigmoid colon (ρ = 0.94; p<0.001)[22]. The correlation between these two measurements is supported by our findings, which show a strong correlation for PSDR with both ADR (ρ = 0.79) and CSSDR (ρ = 0.82). These results suggest that PSDR could serve as a practical surrogate for CSSDR. Furthermore, the correlation of ADR and SDR supports our assumption that endoscopists with higher ADRs will have higher SDRs.

Although good correlation is suggestive that ADR may be a possible surrogate for SDR, the USMSTF 2012 recommendations for surveillance and screening[19] among individuals with baseline serrated lesions suggest the need for SDR benchmarks or thresholds to be ascertained for the prevention of CRC associated with the serrated pathway. Furthermore, it is readily conceivable that some endoscopists may have adequate ADRs and yet not meet SDR benchmarks, which is why this benchmark needs to be established. For example, in a recent article by Greenspan et al, the authors observed that some endoscopists who had average or higher than average ADRs, had low rates for advanced adenoma detection[23]. Thus, an adequate ADR did not ensure adequate advanced adenoma detection. Similarly, in our data, 8.3% (3/36) of the endoscopists with an ADR of ≥25% did not meet the PSDR benchmark of 11% and 25% (9/36) did not meet the CSSDR benchmark of 7%. These results suggest that ADR should only be used as a surrogate indicator for SDR for those endoscopists whose practice quality has been demonstrated to meet both SDR and ADR benchmarks. ADR could potentially be used as a longer-term measure to assess quality for both ADR and SDR for those endoscopists meeting both benchmarks.

One issue to consider when applying benchmark rates to practice is the minimum number of colonoscopies that are needed to provide a reliable assessment of the endoscopist's rate. Based on similar computations by previous investigators[23, 24], we estimate that 500 colonoscopies might provide a reliable assessment of SDR, with relatively narrow confidence intervals. For example, an endoscopist with 500 examinations and a PSDR of 11% would have a 95% CI of 8.3% to 13.7.

Another salient issue for proximal serrated polyp detection rates is the anatomical cutoff used to define the proximal colon. The traditional cutoff for defining proximal versus distal colon, based on the embryological junction of the midgut and hindgut, has been the splenic flexure. Some previous studies have used the splenic flexure, instead of the sigmoid colon, to define the proximal colon for serrated polyp categorization[7, 8, 22]. Because it is believed that the diminutive HPs in the rectosigmoid do not harbor malignant potential, and that a large proportion of SSA/Ps may be distal to the splenic flexure[2], the better anatomical cutoff to identify clinically important (significant) proximal serrated lesions may be the rectosigmoid, as highlighted by the expert panel recommendations[1]. Accordingly, we used the rectosigmoid in our PSDR calculation. However, to provide comparable information, we also calculated the PSDR based on the splenic flexure anatomic cutoff (Table 3). Our PSDR using the splenic flexure (PSDR-SF) for endoscopists with an ADR of ≥35% was 14.2 % and is similar to a smaller Dutch study[25] of 2088 colonoscopies performed by 16 endoscopists (SDR proximal to the splenic flexure = 10.4%, ADR =35.2%), a Polish study[22] of 12,361 examinations (SDR proximal to splenic flexure = 9.7%, ADR =32.3.0%) and an American study[7, 8] of 6681 examinations performed by 15 endoscopists (SDR proximal to

splenic flexure = 13.0%, ADR =38.0%). The American investigators suggested a PSDR benchmark of 5% based on an ADR of 25%[8]. Our data (PSDR-SF =9.1, ADR= 25%) suggest that a higher rate would be appropriate.

Major strengths of our study are the inclusion of nearly 46,000 colonoscopies (nearly 30,000 screening) as well as a large diverse group of endoscopists (n=77) and endoscopy centers (n = 28), from academic and community practices across New Hampshire, strengthening the generalizability of our results. As compared with the studies cited above[8, 22, 25], our NHCR database included many more colonoscopies that were performed by a larger number of endoscopists. More importantly, our data were collected from a diverse group of endoscopists and practices as opposed to the previous studies, which were based largely on data from a small number of academic centers. Additionally, our database includes important quality measures such as withdrawal time and quality of bowel preparation that are prospectively collected. In the current analysis, we observed that longer withdrawal times were associated with higher ADRs. We have previously demonstrated that longer withdrawal times are also associated with higher rates of serrated polyp detection[14]. Thus, our assumption that endoscopists with higher ADR may be better at serrated polyp detection than those with lower ADRs is supported by a longer withdrawal time among these higher performing endoscopists. A study limitation is that, despite the ethnic diversity of NH population, there is significant racial homogeneity; therefore, our results need to be validated in other populations.

An intriguing finding from our study was that the PSDR was greater than the CSSDR. This difference was primarily due to the large number of colonoscopies with diminutive (<5 mm) proximal hyperplastic polyps. Specifically, the percentage of screening colonoscopies that had only diminutive (<5 mm) proximal HPs was 5.1% (1,521/29,960). The colonoscopies with only diminutive HPs accounted for a large percentage of all colonoscopies with proximal serrated polyps (1,521/2,829; 53.8%). These data indicate that endoscopists are detecting and removing many diminutive HPs. Although the prevalence of these lesions is interesting, the clinical significance of diminutive proximal HPs is not yet clear. The recent expert panel suggests closer surveillance intervals for proximal HPs >5 mm but not for those <5 mm[1]

Substantial variation in SDRs among our endoscopists was observed. The largest differences in SDRs were found between endoscopists with ADR ≥35% and those with ADR <15%. For the highest performing endoscopists, ie, endoscopists with an ADR ≥35%, there was an 8-fold increase in screening CSSDR and a 6-fold increase in screening PSDR compared with endoscopists whose ADR was <15%. Variation in serrated polyp detection rates has also been observed in previous studies[6–8, 26]. One study observed a detection rate for proximal hyperplastic polyps (HP) that varied from 1.1% to 6.7%[6]. Another recent study of 15 gastroenterologists at 2 academic endoscopy centers reported proximal serrated polyp detection rates ranging from 1% to 18%[7, 8], whereas a third study observed a wide variation in PSDR among endoscopy centers (0%-9.8%)[27]. These findings highlight the need for SDR benchmarks to guide quality practice.

In summary, NHCR endoscopists who achieved high ADRs had significantly higher SDRs than endoscopists with low ADRs. We used a well-recognized quality measure, ADR, and a large, diverse group of endoscopists to provide data toward establishing benchmarks for appropriate endoscopist SDRs. Based on the recommended benchmark ADR of 25% or greater, an endoscopist median (IQR) screening CSSDR of 7% (6.8% [4.3% – 8.6%]) and median (IQR) screening PSDR of 11% (10.8% [8.6% – 16.1%]) are suggested by this investigation. In this study, endoscopists' SDRs were similar for screening or surveillance indications, suggesting that both indications could possibly be used to derive serrated rates in practice. Subsequent investigation is needed to validate whether achieving these SDR benchmarks will offer protection from cancers that arise from the serrated pathway, and more studies are needed to determine optimal detection rates associated with the lowest risk from serrated cancers.

Acknowledgments

Financial support: The project described was supported by Grants # R01CA131141, #1R21CA191651 and contract # HHSN261201400595P from the National Cancer Institute, as well as by the Norris Cotton Cancer Center. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Cancer Institute or the National Institutes of Health.

Acronyms

ADR	Adenoma detection rate
SDR	Serrated polyp detection rate
SSA/P	Sessile serrated adenomas/polyps
TSA	Traditional serrated adenomas
HP	Hyperplastic polyps
CSSDR	Clinically significant SDR
PSDR	Proximal SDR
NHCR	New Hampshire Colonoscopy Registry
ACG	American College of Gastroenterology
ASGE	American Society for Gastrointestinal Endoscopy
CRC	Colorectal Cancer
BMI	Body Mass Index
IBD	Inflammatory bowel disease

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Table 1

Endoscopist's (N=77) characteristics stratified by endoscopist's screening ADR groups

	ADR (screening colonoscopies)			
	<15% (N=15)	**15% to <25% (N=26)**	**25% to <35% (N=27)**	**≥35% (N=9)**
Endoscopist's Characteristics	**N (col %)**	**N (col %)**	**N (col %)**	**N (col %)**
Median Age (years)				
< 50	4 (26.7)	8 (34.8)	14 (56.0)	7 (87.5)
≥ 50	11 (73.3)	15 (65.2)	11 (44.0)	1 (12.5)
Gender				
Female	3 (20.0)	3 (11.5)	4 (14.8)	1 (11.1)
Male	12 (80.0)	23 (88.5)	23 (85.2)	8 (88.9)
Specialty				
Gastroenterology	5 (33.3)	17 (68.0)	22 (84.6)	7 (87.5)
Surgery	10 (66.7)	7 (28.0)	4 (15.4)	0 (0.0)
Internal Medicine	0 (0.0)	1 (4.0)	0 (0.0)	1 (12.5)
Median NWT (minutes)				
<9	13 (86.7)	14 (56.0)	15 (55.6)	1 (11.1)
≥ 9	2 (13.3)	11 (44.0)	12 (44.4)	8 (88.9)

Abbreviations: ADR: adenoma detection rate, IQR: interquartile range, NWT: median withdrawal time in normal examinations.

Table 2

Endoscopists' serrated polyp detection rates by ADR group and indication for examination

ADR	Screening colonoscopies		Surveillance colonoscopies	
	CSSDR	PSDR	CSSDR	PSDR
	Median (IQR)	Median (IQR)	Median (IQR)	Median (IQR)
<15%	1.3 (0.9 – 3.1)	2.5 (1.1 – 3.1)	0.0 (0.0 – 3.4)	5.2 (0.6 – 6.4)
15% to < 25%	3.5 (2.5 – 4.8)	6.0 (5.0 – 8.4)	1.3 (0.0 – 3.4)	4.3 (2.6 – 5.7)
25% to < 35%	6.3 (3.0 – 7.2)	9.3 (8.2 – 12.1)	4.9 (3.2 – 6.7)	8.1 (4.7 – 12.2)
≥ 35%	10.0 (8.5 – 13.1)	16.2 (15.9 – 23.6)	8.5 (6.4 – 10.2)	14.7 (10.8 – 19.4)

Abbreviations: CSSDR: clinically significant serrated polyp detection rate, PSDR: proximal serrated polyp detection rate, IQR: interquartile range, ADR: adenoma detection rate.

Table 3

Endoscopists' serrated polyp detection rates for screening examinations among male and female populations and endoscopists whose ADR ≥ 25% and > 35%

	Male ADR ≥ 30%	Female ADR ≥ 20%	ADR ≥ 25%3	ADR ≥ 35%3
Serrated Polyp Detection Rates	**Median (IQR)**	**Median (IQR)**	**Median (IQR)**	**Median (IQR)**
CSSDR3	7.4 (4.2 – 9.7)	5.9 (3.1 – 9.0)	6.8 (4.3 – 8.6)3	10.0 (8.5 – 13.1)
PSDR3	11.8 (9.2 – 16.3)	11.5 (7.7 – 14.8)	10.8 (8.6 – 16.1)	16.2 (15.9 – 23.6)
PSDR-SF3	9.5 (6.4 – 13.2)	8.5 (5.7 – 12.2)	9.1 (7.0 – 12.8)	14.2 (12.1 – 16.7)

Abbreviations: CSSDR: clinically significant serrated polyp detection rate, PSDR: proximal serrated polyp detection rate, SF: Splenic Flexure, IQR: interquartile range, ADR: adenoma detection rate.