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Screening colonoscopy: High quality regardless of endoscopist specialty

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ABSTRACT

Background: Data suggests that screening colonoscopy performed by non-gastroenterologists are lower quality with lower adenoma detection rates (ADR). The aim of this study was to investigate the effect of the endoscopist's specialty on quality parameters in screening colonoscopy.
Methods: Screening colonoscopies performed between January 2016 and June 2017 were queried from a prospectively maintained institutional database. Quality parameters including overall ADR, gender-specific ADR, total examination time, cecal intubation rate and withdrawal time were compared between gastroenterology (GI) and colorectal surgery (CRS).
Results: A total of 15,276 patients were included in the study (mean age 60.3 ± 8; 52.4% female). 11,339 (74.2%) of the colonoscopies were performed by GI, and 3937 (25.7%) were by CRS. Withdrawal time and total scope time were shorter in the GI group. Cecal intubation rate was comparable. Overall ADR, female ADR and male ADR were significantly higher in the GI group, although both groups met national quality benchmarks.
Conclusion: Both specialties achieve appropriate quality metrics for screening colonoscopy. Prospectively evaluating each endoscopist's outcomes, regardless of specialty, is an important tool for ongoing quality improvement towards better patient outcomes.

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Introduction

Colonoscopy is the most frequently used method for screening colorectal cancer in the United States and it reduces both the incidence of and death from colorectal cancer when performed with high quality. It has been widely reported that not achieving standard quality metrics in colonoscopy may result in an increased risk of interval colorectal cancer development.[1,2] Therefore, the quality of the colonoscopy is imperative for its success and various quality factors have been established, such as adenoma detection rate (ADR), cecal intubation rate (CIR), withdrawal time, polypectomy rate, complication rate, and the quality of the bowel preparation.[1,3]

Recent literature suggests, that in addition to the above mentioned quality parameters, the endoscopist's specialty should also be considered as an independent predictor of colonoscopy quality.[4–7] It has been reported that if a negative colonoscopy was performed by any specialty *other* than gastroenterology, those patients will have an increase in interval colorectal cancer development.[4]

In our institution, a high-volume tertiary referral center, screening colonoscopies are performed by both gastroenterology (GI) and colorectal surgery (CRS). We hypothesized that screening colonoscopy performed by specialty-trained colorectal surgeons would meet national quality benchmarks. Therefore, the aim of this study was to investigate the effect of the endoscopist's specialty on quality parameters in asymptomatic patients undergoing low-risk screening colonoscopy.

Methods

We identified consecutive screening colonoscopies performed between January 2016 and June 2017 by querying a prospectively maintained institutional colonoscopy database after Institutional

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Table 1
Demographics and metrics by specialty.

	Gastroenterology (N = 11,339)	Colorectal Surgery (N = 3937)	p-value
Age	60.3 ± 8	60.4 ± 8.1	0.27
Gender (Female)	5954 (52.7)	2023 (51.6)	0.38
Quality of bowel preparation (Good)	11,003 (97.1)	3789 (96.3)	**0.014**
Endoscopist frequency	109.0 [45.0,244.0]	137.0 [29.0,225.0]	0.92
Withdrawal Time (minutes)	10.1 ± 6.5	10.6 ± 6.2	**<0.001**
Total Scope Time (minutes)	19.1 ± 9.3	21.9 ± 10.2	**<0.001**
Cecal intubation (Yes)	11,256 (99.3)	3914 (99.4)	0.35
Adenoma detection rate	3520 (31.0)	998 (25.3)	**<0.001**
Adenoma detection rate (Female)	1504 (25.3)	421 (20.8)	**<0.001**
Adenoma detection rate (Male)	2009 (37.7)	574 (30.2)	**<0.001**

Statistics presented as Mean ± SD, Median [P25, P75], Median (min, max) or N (column %).

Review Board approval. Patients were included in the analysis as low-risk screening if they were: 50 years of age or older, had absence of symptoms, had no colorectal cancer or polyp previously identified at colonoscopy, and/or were undergoing their first ever colonoscopy. Colonoscopies performed in the outpatient setting and under conscious sedation only were included in the analysis.

Demographic variables such as age, gender, and body mass index were included in the analysis. Quality parameters were as follows: ADR, male ADR, female ADR, cecal intubation rate, total examination time, withdrawal time, intra-procedural complications, and quality of bowel preparation. All adenomas were histopathologically confirmed from polypectomy specimens. Additionally, the mean number of colonoscopies per endoscopist was calculated and compared between the specialties. Patients were allocated to two groups based on the physician's specialty who performed the procedure, GI or CRS.

Statistical analysis

Endoscopist specialty and adenoma groups were compared by conducting univariate analyses on demographics and colonoscopy metrics. The case volume per endoscopist was also compared across groups. Data is reported as mean ± standard deviation, median (range), or median [25th percentile, 75 percentile] for continuous factors and as frequency (percent) for categorical factors. Pearson's chi-square test or Fisher's exact test was used for categorical factors, and ANOVA was used for continuous factors. Frequency tables were created to compare the distribution of specific colonoscopy complications across specialties and presence of adenoma. All analyses were performed using SAS (version 9.4, The SAS Institute, Cary, NC), and p-values < 0.05 were considered statistically significant.

Results

Between January 2016 and June 2017, a total of 15,276 consecutive patients were included in the study. Mean patient age was 60.3 ± 8 and 52.4% were female. Overall, 11,339 (74.2%) of the colonoscopies were performed by 73 GI endoscopists, and 3937 (25.7%) by 19 CRS endoscopists. The mean number of scopes by an individual GI endoscopist was 109 and the mean number scopes by a CRS endoscopist was 137. A detailed comparison between the groups is listed in Table 1. There were no differences between the groups in terms of demographics or endoscopist characteristics.

There were no differences in cecal intubation rate between the groups. The GI group had a significantly shorter total examination time and withdrawal time. Overall adenoma detection rate (31% vs 25.3%, $p < 0.001$), female adenoma detection rate (25.3% vs. 20.8%, $p < 0.001$) and male adenoma detection rate (37.7% vs. 30.2%, $p < 0.001$) were higher in the GI group. However, both groups met national quality benchmarks (≥30% for men and ≥20% for women) as shown in Table 1.

Bowel preparation was graded significantly lower in the CRS group. There was no statistical difference in complication rate between the GI and CRS groups. Overall intra-procedural complication rate was 0.05% (7/15,276) and these were cardiovascular in six patients and pulmonary in 1 patient. There was no immediate bowel perforation or hemorrhage in the study groups.

A subgroup analysis was performed comparing patients with an adenoma found at screening to those who did not have any adenoma detected (4518 vs. 10,758). Patients who had an adenoma found during examination were significantly older and more likely to be male. The adenoma positive group also had significantly longer examination and withdrawal times. Bowel preparation quality did not reveal any difference between the groups ($P = 0.06$) but did trend toward being significantly worse in the CRS group (Table 2).

Discussion

This study analyzed quality parameters in screening colonoscopies between GI and CRS specialties at a tertiary-level hospital system. Data reveals that all colonoscopic quality metrics were met or exceeded in both groups, and specifically the ADR was at or above the suggested benchmark values, regardless of endoscopist

Table 2
Demographics and Metrics by Adenoma detection groups.

Adenoma Detection	No (N = 10,758)	Yes (N = 4518)	p-value
Age	60 ± 8	61.1 ± 8	**<0.001**
Gender (Female)	6052 (56.6)	1925 (42.7)	**<0.001**
Quality of bowel preparation (Good)	10,398 (96.7)	4394 (97.3)	0.06
Withdrawal Time (minutes)	8.9 ± 5.1	13.4 ± 8	**<0.001**
Total Scope Time (minutes)	18.5 ± 8.6	23 ± 11	**<0.001**
Cecal intubation (Yes)	10,664 (99.1)	4506 (99.7)	**<0.001**

Statistics presented as Mean ± SD, Median [P25, P75], Median (min, max) or N (column %).

specialty.

The role of withdrawal time as a quality indicator has been well established with most studies reporting high quality outcomes in terms of its effect on increased ADR.[8,9] Suggested withdrawal time performance target for screening colonoscopy is ≥6 min as proposed by The American Society of Gastrointestinal Endoscopy (ASGE) and The American College of Gastroenterology (ACG) Task Force on Quality in Endoscopy.[1] Shaukat et al. reported that longer withdrawal times were associated with higher adenoma detection rates and withdrawal time greater than 8 min were associated with the lowest risk of developing interval colorectal cancer.[9] In line with the proposed metrics, withdrawal times were 10.1 min for the GI and 10.6 min for the CRS study group, which may have contributed to achieving the benchmark adenoma detection rates. When we compared the colonoscopies in which adenomas were detected to those without any adenoma detection, withdrawal time and total examination time were also significantly longer, confirming previous reports on the importance of adhering to appropriate time spent surveying the colonic mucosa during withdrawal of the scope.[9]

Similarly, a cecal intubation rate (CIR) of 99% was achieved in both groups, revealing high quality. A CIR of at least 95%, regardless of sex, should be achieved for all colonoscopies, as it also has been shown to be related to ADR and the development of interval colorectal carcinoma. Dejong et al.[10] and Baxter et al.[11] revealed lower CIR amongst surgeons and internists compared to gastroenterologists, but our study contradicts this data and did not reveal any difference based on the specialty of the endoscopist.

The ADR is widely considered the single most significant colonoscopy quality measure, which is described as a colonoscopy in which one or more histologically confirmed adenomas are detected.[1,2,6] Accordingly, the ASGE/ACG Task Force on Quality in Endoscopy describes performance targets for ADR as ≥25% overall, ≥30% for men and ≥20% for women.[1] Furthermore, ADR has found to be a significant factor in predicting the risk for interval colorectal cancer after colonoscopy and Kaminski et al. reported that adenoma detection rates lower than 20% are associated with significantly increased risk for interval colorectal cancer.[2]

In a study by Kozbial et al., looking at over 59,000 colonoscopies, the authors found no statistical difference in ADR between gastroenterologists and surgeons with an overall ADR of 20.5%.[7] Recent international studies however, have compared surgeons and gastroenterologists performing colonoscopies in a variety of settings, training levels and indications, showing that specialty may indeed have an effect on ADR and quality.[3,4,10] Similar to this, our results show higher rates of adenoma detection in GI group, reaching 31% overall ADR in the GI group versus 25.3% for CRS. The reason for the higher ADR by GI in this study may be due a myriad of factors, such as higher overall volume, higher number of colonoscopies during training, or possibly better adherence to internal quality programs. It has also been shown that poor or inadequate bowel preparation plays a role in lower ADR and polypectomy rates.[1] The CRS group had a statistically significant worse overall bowel preparation in all patients and trended toward significance in the ADR positive patients, which may, in part, explain the lower ADR rate in this group.

In a study by Hassan *et al,* the authors revealed that colonoscopies performed by non-GI endoscopists resulted in less efficient colorectal cancer detection which resulted in increased costs.[12] However, the author's recommendations were to not shift colonoscopy from non-GI to GI, but rather, they suggested the need for internal quality improvement programs for each individual endoscopist, regardless of specialty. As such, the ASGE/ACG Task Force on Quality in Endoscopy suggests endoscopists from different specialties should participate in quality improvement programs to achieve the endorsed quality benchmarks.[1] In keeping with these suggestions, our institution has implemented a quality improvement program, which includes the benchmarking of each endoscopist's performance, and the data is given to each individualized endoscopist on a quarterly basis.

There are certain limitations to this study, namely it is a retrospective analysis from an institutional colonoscopy database. Screening colonoscopies only were queried, and the possibility of omitted or incorrectly coded procedures is possible. Also, the development of interval colorectal cancer cannot be determined in this analysis, since follow up surveillance data is not available. Additionally, 30-day complications could not be ascertained, such as delayed bleeding, perforation or post polypectomy syndrome; therefore our outcomes are limited to immediate intra-procedural complications.

This study reveals that high quality can be achieved at screening colonoscopy regardless of endoscopist specialty. Adherence to national and/or institutional quality guidelines is important to each individual endoscopist, and not necessarily to their specialty.

Conclusion

Assessing quality metrics for screening colonoscopies for all proceduralists, regardless of specialty, allows for identification of areas of improvement. Prospectively evaluating each endoscopist's outcomes is an important tool for ongoing quality improvement towards better patient outcomes.

Conflicts of interest

The authors have no conflicts of interest or financial ties to disclose. Authors of the manuscript are: Ipek Sapci, MD, Alexandra Aiello, BS, Emre Gorgun, MD, Maged Rizk, MD, Conor P. Delaney, MD, PhD, Scott R. Steele, MD, Michael A. Valente, DO.

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