

Performance measures of surgeon-performed colonoscopy in a Veterans Affairs medical center

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Abstract

Background Quality indicators are increasingly emphasized in the performance of colonoscopy. This study aimed to determine the standard of care rendered by surgeon-endoscopists in a Veterans Affairs (VA) medical center by evaluating the indications for colonoscopy and outcome performance measures according to established quality indicators for colonoscopy.

Methods A prospective standardized computer endoscopic reporting database (ProVation MD) was retrospectively reviewed. All colonoscopies performed by attending surgeons at the San Diego VA medical center between 1 January 2004 and 31 July 2007 were included in the study. Patients with charts that had incomplete reporting were excluded. The quality indicators used included the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) criteria for colorectal cancer screening, the American Cancer Society (ACS) guidelines for post-cancer resection surveillance, and the American Society of

Gastrointestinal Endoscopists (ASGE) quality indicators for colonoscopy.

Results The data for 558 patients (96% men) were analyzed. The average patient age was 63 years (range, 25–93 years). Almost all the colonoscopies (99%) were performed in accordance with established criteria. The most common indications for colonoscopy were screening ($n = 143$, 26%), non-acute gastrointestinal bleeding ($n = 127$, 23%), polyp surveillance ($n = 100$, 18%), postcancer resection surveillance ($n = 91$, 17%), abdominal pain ($n = 19$, 4%), and anemia ($n = 14$, 3%). Postcancer resection surveillance colonoscopies were performed according to recommended criteria in 98% of the cases. The cecal intubation rate was 97%, and the overall adenoma detection rate was 26%. Two patients (<1%) experienced complications requiring intervention.

Conclusion The study data indicate that surgeon-performed colonoscopies meet standard quality criteria for indications and performance measures. The authors therefore conclude that surgeon-endoscopists demonstrate proficiency in the standard of care for colonoscopy examinations.

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Colonoscopy has a well-established role in the evaluation and treatment of colonic diseases, and in the hands of the surgeon, its use has centered around the screening, potential treatment, and surveillance of colorectal neoplasia. Currently, in light of the rapidly expanding field of minimally invasive surgery, especially with regard to recent advancements in natural orifice transluminal endoscopic surgery (NOTES), endoscopy—including colonoscopy—

has the potential to take on a much greater role in a surgeon's practice. Alongside these developments, the Accreditation Council for Graduate Medical Education (ACGME) has increased the endoscopy requirements for surgical residents to a minimum of 85 total endoscopies, including at least 50 colonoscopies, by the time of their graduation [1].

Together with the recognized need for increased training of surgical residents, recent literature has focused on measurements used to determine proficiency and competence in the endoscopists' performance of colonoscopy. As a result, several guidelines and quality indicators for the performance of colonoscopies have been published, including criteria such as adenoma detection and cecal intubation rates [2]. In this study, we assessed the quality and competence of surgeon-endoscopists to perform colonoscopies at a Veterans Affairs (VA) medical center by measuring their performance outcomes according to established quality indicators.

Materials and methods

We performed a retrospective chart review of all colonoscopies performed between 1 January 2004 and 31 July 2007 by two attending surgeons (B.C.C., a colorectal surgeon, and M.K.S., a general and laparoscopic surgeon) at the VA medical center in San Diego, as reported in Pro-Vation MD. Patients with charts that had incomplete reporting were excluded from the study.

For each colonoscopy, the following data were collected: age, gender, indication, findings (including the

number and location of polyps when known), and pathology report. The data were compared with grade 1 recommendations for quality indicators proposed by the American Society for Gastrointestinal Endoscopy (ASGE) for colonoscopy [2] (Table 1) and with the postcancer resection surveillance guidelines from the American Cancer Society (ACS) [3] (Table 2). Screening guidelines were obtained from the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES).

Results

From 1 January 2004 to 31 July 2007, a total of 558 colonoscopies were performed by two attending surgeons at the Veterans Affairs Healthcare System in San Diego, California. The mean age of the patients was 63.3 years (range, 25–93 years), with 89% of them older than 50 years. Most of the patients (96%) were men.

The indications for the colonoscopies are presented in Table 3. Some patients had more than one indication for colonoscopy. Overall, 99% of the procedures were performed in accordance with the guidelines for appropriate indications established by ASGE [4]. Indications not in accordance with the standard guidelines included screening of four asymptomatic individuals younger than 50 years without a family history, workup of two patients with a small bowel obstruction, and workup of one patient with recurrent bacteremia of unknown source.

The cecum was successfully intubated with identification of landmarks in 541 (97%) of 558 colonoscopies and in 143 (98%) of 146 screening colonoscopies. The reasons

Table 1 Grade 1 recommendations for quality indicators for colonoscopy^a

1.	Appropriate indication
2.	Use of recommended postpolypectomy and postcancer resection surveillance intervals
3.	Cecal intubation rates
4.	Detection of adenomas in asymptomatic individuals (screening)
5.	Number and distribution of biopsy samples in ulcerative colitis and Crohn's colitis surveillance
6.	Postpolypectomy bleeding managed non-operatively

^a Adapted from Ref. [2]

Table 2 Postcancer resection surveillance colonoscopy recommendations^a

1.	Patients should receive a perioperative clearing colonoscopy to rule out synchronous lesions (either intraoperatively or within 6 months).
2.	Patients undergoing curative resection for colorectal cancer should undergo a colonoscopy 1 year after the resection (or 1 year after the completion colonoscopy).
3.	If the examination performed at 1 year shows normal results, then the interval before the next subsequent examination should be 3 years.
4.	If that examination shows normal results, the interval should be 5 years.
5.	Intervals may be shortened if adenoma findings warrant it or if there is evidence of hereditary non-polyposis colorectal cancer.
6.	Examinations at 3- to 6-month intervals for the first 2 or 3 years should be considered after low anterior resection.

^a Adapted from Ref. [3]

Table 3 Indications for colonoscopy

Indication	No. of cases (% of total)
Screening	143 (26)
Nonacute GI bleeding	127 (23)
Polyp surveillance	100 (18)
Postcancer resection surveillance	91 (17)
Abdominal pain	19 (4)
Anemia	14 (3)
Abnormal radiographic finding	10 (2)
Change in bowel habits	4 (<1)
Clearing colonoscopy	3 (<1)
Rectal mass	3 (<1)
Others	33 (6)

GI gastrointestinal

for failure of cecal intubation included redundancy ($n = 6$), inability to get past strictures ($n = 4$), poor bowel preparation ($n = 4$), patient discomfort and intolerance ($n = 2$), and intentional early termination after tattooing of adenoma site ($n = 1$).

Of 91 completed postcancer resection surveillance colonoscopies, 89 (98%) were performed within the recommended surveillance intervals. Two colonoscopies were performed at an earlier time than the recommended interval. None of the postcancer resection surveillance colonoscopies detected a metachronous carcinoma. Of the three clearing colonoscopies, two showed a synchronous neoplastic lesion (one tubulovillous adenoma and one tubulovillous adenoma with a focus of adenocarcinoma).

The colonoscopy findings are presented in Table 4. If two or more polyps were found in a single procedure, the colonoscopy result was classified according to the most advanced pathologically staged lesion. In 13 of the 541

completed colonoscopies, polyps were visualized that had not undergone a biopsy for various reasons, had undergone an unsuccessful biopsy, or had yielded insufficient tissue for pathology analysis. In completed colonoscopies ($n = 541$), the detection rates were 36% for all polyps (benign and malignant), 22% for adenomatous polyps, and 4% for cancerous lesions (including eight nonpolypoid cancerous masses). Thus, the overall neoplastic lesion detection rate was 26%. This rate increased to 29% for patients 50 years of age or older, whereas it was 5% for patients younger than 50 years. Our detection rate for neoplastic lesions in screening colonoscopies was 20% (28/143). Of the 303 polyps subjected to biopsy, 62% were neoplastic. Eight nonpolypoid masses also were detected, and all eight tested positive for cancer, one of which was prostate cancer.

Two major complications (<0.4%) resulted from the colonoscopies: one postpolypectomy bleeding (<0.2%) and one perforation (<0.2%). There was no mortality. The postpolypectomy bleeding occurred in an 83-year-old man with multiple comorbidities. After being admitted, he received 2 U of transfused packed red blood cells and was observed. He was discharged on hospital day 2. The colonic perforation occurred in a 74-year-old man. He was taken to the operating room, where he received a primary repair without diversion. Both patients were discharged home in stable condition.

Discussion

The role of endoscopy in a surgeon's practice is rapidly evolving. In addition to its established traditional use in the diagnosis and treatment of gastrointestinal diseases, the indications for its use are expanding. Current indications include endoscopic mucosal tumor resection, increasingly

Table 4 Colonoscopy results

	<i>n</i> (%)	Benign polyps <i>n</i> (%)	Adenoma <i>n</i> (%)	Cancer <i>n</i> (%)	Neoplastic lesions <i>n</i> (%)
Total	541	63 (12)	121 (22)	21 (4)	142 (26)
<i>Ages (years)</i>					
Age >50	483 (89)	51 (11)	119 (25)	20 (4)	139 (29)
Age <50	58 (11)	12 (21)	2 (3)	1 (2)	3 (5)
<i>Gender</i>					
Male	517 (96)	61 (12)	118 (23)	21 (4)	139 (27)
Female	24 (4)	2 (8)	3 (13)	0 (0)	3 (13)
<i>Indications</i>					
Screening (including FH)	143	15 (10)	23 (16)	5 (3)	28 (20)
Polyp surveillance	100	12 (12)	37 (37)	3 (3)	40 (40)
CA surveillance	91	15 (16)	31 (34)	0 (0)	31 (34)

FH family history, CA cancer

complex and aggressive early-stage neoplasm and cancer resection, among others. The recent interest in natural orifice transluminal endoscopic surgery (NOTES) offers further possibilities for treating extraintestinal diseases endoscopically.

Historically, surgeon-endoscopists have demonstrated the ability to perform colonoscopies well, with good overall performance and low complication rates. Reed et al. [5] presented a favorable complication rate of 0.10% among non-fellowship-trained surgeons, concluding that no specific fellowship training was required. Wexner et al. [6] performed a large prospective analysis of 13,580 colonoscopies that further demonstrated the surgeon's ability to perform endoscopies rapidly and successfully with low morbidity and mortality rates.

Recently, guidelines for colonoscopy quality indicators have been proposed by several entities including SAGES, ASGE [2] (Table 1), and ACS [3] (Table 2). The emphasis includes appropriate indications and other objective criteria such as an adenoma detection rate and a cecal intubation rate. We applied these guidelines in our study to determine the appropriateness and competency of the colonoscopies performed by surgeon-endoscopists at a Veterans Affairs Healthcare System. We found that surgeon-endoscopists were able to meet or exceed expected quality outcomes when the data were specifically examined across a set of quality indicators, as delineated below.

Indications

Less than 1% of our colonoscopies failed to meet guidelines for appropriate indications for colonoscopy as determined by ASGE after review of the published literature and expert consensus [4]. These "appropriate" indications do not demand strict adherence. Rather, they serve as a reminder that colonoscopies are invasive procedures with inherent risks that must be considered carefully.

In our study, four patients younger than 50 years received a screening colonoscopy although they were asymptomatic and had no family history. In two of these cases, the patient admitted to having poor follow-up evaluation by physicians, with neglect toward their overall health issues. Two colonoscopies were performed for patients with a small bowel obstruction, and one colonoscopy was performed as part of a workup for a patient with recurrent bacteremia of an unclear source.

Interestingly, screening made up a large portion of the indications for colonoscopy in our series. This differs from most colonoscopy series reported by surgeons, in which the majority of the colonoscopies are performed for rectal bleeding, cancer surveillance, or changes in bowel habits [5, 7, 8].

Postcancer resection surveillance intervals

Using guidelines established by the ACS in collaboration with the U.S. Multi-Society Task Force on Colorectal Cancer [3], we determined that 89 of our 91 postcancer surveillance group were scoped within the recommended intervals. The two patients who did not receive a colonoscopy within the recommended surveillance intervals were scoped at a shorter interval than recommended. Of the three clearing colonoscopies performed, two identified synchronous neoplastic lesions. In the 91 postcancer resection surveillance colonoscopies, we found no metachronous cancer. Rex et al. [3] reviewed 23 series of postcancer resection surveillance colonoscopy in the literature and found the collective average detection rate of metachronous cancer to be 1 per 157.

Cecal intubation rate

Landmarks identified from intubation of the cecum generally are used as an end point in determining performance outcome. In our series, the cecum was successfully intubated in 97% of all colonoscopies. This rate compares favorably with expected completion rates quoted in the literature [9]. A 98% completion rate was achieved in the screening subgroup. This is in line with the 97.7% cecal intubation rate achieved by Lieberman et al. [10] in their series of VA patients. By comparison, the expected cecal intubation rates are 90% for all colonoscopies and 95% for screening colonoscopies [2].

Adenoma detection

In our series, the overall adenoma detection rate was 26%, and the detection rate for all polyps was 36%. These numbers mirror the detection rates obtained by Wexner et al. [6] in their large prospective series of 13,580 colonoscopies. As expected, the adenoma detection rate was much higher for patients older than 50 years (29% vs 5% for patients younger than 50 years). Among our limited number of women, the adenoma detection rate was 13%, less than half that for men (27%).

In our sample of 143 screening studies, neoplastic lesions (adenomas + cancer) were detected in 19.6% of all screening colonoscopies. This rate increased to 20.5% when corrected for patients younger than 50 years and for women. By comparison, Goldenberg et al. [11] performed screening colonoscopies for 55 patients recruited from an academic general surgery practice. The polyp detection rate was 18%, and the adenoma detection rate was 11%. Rex et al. [2] report adenoma prevalence rates of at least 25% for men older than 50 years.

The literature shows a wide variation in adenoma detection between practices and practitioners [12]. Barclay et al. [13] found an overall detection rate of 23.5% for neoplastic lesions in all patients screened by a group of 12 experienced gastroenterologists. However, this detection rate differed greatly between practitioners, ranging from 9.4% to 32.7%. Barclay et al. [13] found a direct correlation between withdrawal time and the adenoma detection rate. Data on withdrawal time were not available to us through ProVation MD.

Inflammatory bowel disease surveillance

Due to the limited number of colonoscopies performed for patients with inflammatory bowel disease in our series ($n = 4$), the study was underpowered to address this quality indicator.

Complications

In our series, two major complications occurred: one postpolypectomy bleeding requiring intervention (<0.2%) and one colonic perforation (<0.2%) surgically repaired using a primary anastomosis without diversion. There was no mortality. The ASGE reports a postpolypectomy bleeding risk of less than 1%. This risk ranges from 0.07% [5] to 3% [14] across the literature. Anderson et al. [15] reported a 0.19% perforation rate in 10,486 colonoscopies. Iqbal et al. [16] performed a retrospective review of 78,702 colonoscopies in the surgical literature, finding a perforation rate of only 0.084%. Therefore, our complication rate, including perforations and bleeding, was consistent with published data.

Overall, using specific quality indicators for comparison, we confirmed through our study that surgeons demonstrate the ability to perform colonoscopy well, with good performance outcomes and a high level of safety. One weakness of our study was its inability to report on withdrawal time. Also, it would be interesting to apply these same quality indicators to surgical residents in their performance of colonoscopy through their years of training.

In conclusion, surgeon-endoscopists demonstrate proficiency in performing colonoscopies according to proposed guidelines. With the increased requirement of surgical training for colonoscopies, further studies are needed to determine whether these surgeon-endoscopists then can adequately train residents in these skills.

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