ORIGINAL ARTICLE

Impact of fellowship training level on colonoscopy quality and efficiency metrics

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Background and Aims: Previous studies have described variable effects of fellow involvement on the adenoma detection rate (ADR), but few have stratified this effect by level of training. We aimed to evaluate the "fellow effect" on multiple procedural metrics including a newly defined adenoma management efficiency index, which may have a role in documenting colonoscopy proficiency for trainees. We also describe the impact of level of training on moderate sedation use.

Methods: We performed a retrospective review of 2024 patients (mean age, 60.9 ± 10 years; 94% men) who underwent outpatient colonoscopy between June 2012 and December 2014 at our Veterans Affairs Medical Center. Colonoscopies were divided into 5 groups. The first 2 groups were first-year fellows in the first 6 months and last 6 months of the training year. Second- and third-year fellows and attending-only procedures accounted for 1 group each. We collected data on doses of sedatives used, frequency of adjunctive agent use, procedural times, and location, size, and histology of polyps. We defined the adenoma management efficiency index as average time required per adenoma resected during withdrawal.

Results: Of the colonoscopies performed, 1675 involved a fellow and 349 were performed by the attending alone. There was no difference in ADR between fellows according to level of training ($P = .8$) or between fellows compared with attending-only procedures ($P = .67$). Procedural times decreased consistently during training and declined further for attending-only procedures. This translated into improvement in the adenoma management efficiency index (fellow groups by ascending level of training: 23.5 minutes vs 18.3 minutes vs 13.7 minutes vs 13.4 minutes vs attending group 11.7 minutes; $P < .001$). There was no difference in the average doses of midazolam and fentanyl used among fellow groups ($P = .16$ and $P = .1$, respectively). Compared with attending-only procedures, fellow involvement was associated with higher doses of fentanyl and midazolam and more frequent use of diphenhydramine and glucagon ($P < .0001$, $P = .0002$, $P < .0001$, and $P = .01$, respectively).

Conclusions: ADR was similar at different stages of fellowship training and comparable with the attending group. Efficiency of detecting and resecting polyps improved throughout training without reaching the attending level. Fellow involvement led to a greater use of moderate sedation, which may relate to a longer procedure duration and an evolving experience in endoscopic technique. (Gastrointest Endosc 2018;■:1-10.)

Colorectal cancer (CRC) is the third most common cancer and the third leading cause of death in the United States.[1] Colonoscopy is the preferred method for CRC screening.[2] The role of colonoscopy in reducing the incidence and mortality of CRC is well established.[3-5]

Colonoscopy is not without shortcomings. Interval CRC is inversely proportional to the quality of colonoscopy and, in particular, to the adenoma detection rate (ADR).[6,7] Studies have demonstrated a wide variability in ADR between endoscopists, with longer withdrawal times associated with

Abbreviations: ADR, adenoma detection rate; CRC, colorectal cancer; IQR, interquartile range.

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a higher ADR.[8,9] Involving gastroenterology fellows in colonoscopy prolongs procedure times,[10] leading to longer withdrawal times for first-year fellows that tend to decrease with further training.[11] However, compared with attending-only procedures, the impact of fellow involvement on ADR is variable.[12-16] Few studies stratified this impact by year of training. Some showed no difference,[11,12] whereas others showed higher ADR with higher levels of training.[13] Furthermore, tracking trainee progress in the identification and endoscopic management of adenomas during withdrawal is difficult because objective assessment measures to evaluate competence in colonoscopy are limited.[17]

Endoscopic procedures in the United States are traditionally conducted under moderate sedation using an opioid analgesic and a benzodiazepine.[18] Diphenhydramine may be used to improve the quality of sedation and decrease opioid and benzodiazepine requirements, whereas glucagon is sometimes used for its antispasmodic properties to facilitate scope manipulation and potentially reduce patient discomfort.[19,20] To our knowledge, there are no studies on the effect of fellow involvement on use of moderate sedation and its adjuncts.

We aimed to evaluate the "fellow effect" on ADR and adenoma management efficiency, stratified by level of training. Additionally, we hypothesized that higher levels of training would lead to a progressive decrease in amount of moderate sedation use and shorter procedural times as a reflection of improved endoscopic technique.

METHODS

Patient population

We performed a retrospective review of all outpatient colonoscopies performed between June 2012 and December 2014 at the Veterans Affairs Medical Center (VAMC) in Oklahoma City, Oklahoma. The study was approved by the University of Oklahoma Health Sciences Center Institutional Review Board and the Oklahoma City VAMC Research and Development Committee. Indications for colonoscopy included screening, positive fecal immunohistochemistry test, surveillance, and symptoms (eg, abdominal pain, chronic diarrhea). Patients with missing data and aborted procedures because of poor bowel preparation or failure to reach the cecum were excluded. Procedures performed with the patients under general anesthesia or deep sedation with propofol were also excluded. All patients received polyethylene glycol–based bowel preparation in a standard or split-dose regimen (split-dose became standard at our center as of January 2014) and were instructed to follow a clear liquid diet for 1 to 2 days before the procedure.

Study design

Colonoscopies were performed by 1 of 15 general gastroenterology fellows spanning all 3 years of training under the supervision of 1 of 8 gastroenterology attending physicians. Each attending had performed more than 2000 colonoscopies before inclusion in the study. The fellows were assigned based on monthly rotations. Two supervising attendings covered the same day of the week throughout the year. The fellow initiates the procedure, and verbal attending instructions are provided throughout. Hands-on attending assistance is available as needed (eg, difficult scope insertion or difficult polypectomy). Supervision of trainees was defined by a consistent curricular policy whereby attendings were present in the room for the entire procedure for first-year fellows (Level 1 or Accreditation Council for Graduate Medical Education direct supervision). For second- and third-year fellows, the attending was present within the endoscopy lab and immediately available for the entire procedure with physical presence for key procedural events (eg, time out, cecal identification, therapeutic interventions; Level 2 or Accreditation Council for Graduate Medical Education indirect supervision). Attending intervention in performing a portion of these supervised procedures was part of the clinical care and left to the discretion of the supervising attending endoscopist but typically was more likely with first-year trainees. Some procedures were performed by the attending physician alone, and these attending gastroenterologists were the same as the attendings supervising fellow procedures. For patients undergoing combined procedures (ie, EGD and colonoscopy), the decision as to which procedure was performed first was left to the discretion of the attending physician.

Colonoscopies were divided into 5 groups. For first-year fellows, the academic year was split halfway (first 6 months of training vs second 6 months of training). Second- and third-year fellows and attending-only procedures accounted for the other 3 groups.

Moderate sedation included the use of midazolam and fentanyl for all patients and adjunctive use of diphenhydramine as needed at the discretion of the fellow or attending performing the procedure. Intraprocedural glucagon use was reserved for cases during which vigorous colonic motility interfered with navigation or the provision of therapeutic maneuvers. High-definition colonoscopes (CF-HQ190L/I and PCF-H180AL/I; Olympus America, Center Valley, Pa) were used for all procedures. Room air was used for insufflation. Endoscopic and patient monitoring equipment were standard across all 3 rooms.

Data collection

Patient demographics, including age, sex, race, history of alcohol abuse, smoking history (active smoker), family history of CRC, and procedural indication, were collected using the electronic health record system at VAMC. Doses of sedatives; antispasmodic use; polyp number, size, and location; quality of bowel preparation; and procedure times (insertion, withdrawal, and total procedure duration)