CLINICAL—ALIMENTARY TRACT

Regional Variation in Anesthesia Assistance During Outpatient Colonoscopy Is Not Associated With Differences in Polyp Detection or Complication Rates

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BACKGROUND & AIMS: We investigated the rate and predictors of anesthesia assistance during outpatient colonoscopy and whether anesthesia assistance is associated with colonoscopy interventions and outcomes. **METHODS:** We performed a retrospective cohort study using a 20% sample of Medicare administrative claims submitted during the 2003 calendar year. We analyzed data from 328,177 adults, 66 years old or older, who underwent outpatient colonoscopy examinations. **RESULTS:** Overall, 8.7% of outpatient colonoscopies were performed with anesthesia assistance. In multivariate analysis, independent predictors of anesthesia assistance included black race, female sex, and a nonscreening indication; anesthesia assistance increased with median income and comorbidities. General and colorectal surgeons, fewer years in their practice, and nonhospital site of service were also significantly associated with anesthesia assistance. The strongest predictor of anesthesia assistance was the Medicare carrier, with odds ratios ranging from 0.22 (95% confidence interval: 0.12−0.43) for the Arkansas carrier (crude rate 0.9%) to 9.90 (95% confidence interval: 7.92−12.39) for the Empire carrier in New York area (crude rate 35.3%) compared with the Wisconsin carrier (crude rate 4.3%). There was also considerable variation among endoscopists; 75% of providers had no colonoscopies with anesthesia assistance recorded in their dataset, and 4.5% of providers had anesthesia assistance in at least three quarters of their examinations. Anesthesia assistance was not associated with the diagnosis of polyps, the performance of biopsy or polypectomy, or complications in multivariate analyses. **CONCLUSIONS: There are significant variations among regions and sites of service in anesthesia assistance during outpatient colonoscopies of Medicare beneficiaries. Although this variation has considerable economic implications, it was not associated with measures of patient risk or outcomes, such as polyp detection or procedure-related complications.**

Keywords: Colorectal Cancer Screening; Cost Efficacy; Quality; Pain.

Colonoscopy is one of the most commonly performed ambulatory procedures in the United States, with an estimated 14 million procedures in 2002.[1] Although unsedated colonoscopy has been shown to be well tolerated,[2,3] most colonoscopies in the United States are performed with moderate sedation.[4,5] In fact, the use of sedation has been associated with a higher-quality examination, including higher polyp detection and more complete examination of the colon, when compared with unsedated colonoscopy.[6]

In recent years, there have been reports of increasing use of propofol for deep sedation during colonoscopy.[7,8] Purported advantages of propofol sedation include a fast onset of action, short duration of action, and amnestic effects. A systematic review for the Cochrane Collaboration concluded that propofol for sedation during colonoscopy resulted in faster recovery and discharge times and increased patient satisfaction without an increase in side effects.[9] However, there was no difference in procedure time, cecal intubation rate, or complications. A safety review of 646,000 colonoscopies with endoscopist-administered propofol sedation demonstrated serious complication rates comparable with, or lower than, those with standard moderate sedation, including benzodiazepines and opioids.[10] The current Food and Drug Administration−approved product label for propofol states that it should only be administered by individuals trained in the administration of general anesthesia.[11] As a result, another provider (ie, an anesthesiologist or nurse anesthetist) is usually present during the endoscopic procedure if propofol sedation is used.

Although the American Society for Gastrointestinal Endoscopy states that the use of an anesthesiologist's services during routine colonoscopy in average-risk patients is not warranted and is cost prohibitive,[8,12] recent studies have demonstrated that this practice is increasingly common.[13,14] Current colonoscopy reimbursement already includes a component to cover the work associated with administration of intravenous sedation, so the inclusion

Abbreviations used in this paper: AA, anesthesia assistance; CI, confidence interval; CPT, Current Procedural Terminology; ICD-9, International Classification of Diseases, Ninth Revision, Clinical Modification; RUCA, Rural Urban Commuting Area.

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of an anesthesia professional's services leads to additional charges for sedation. Because the national Medicare mean allowable charge for the additional services of an anesthesia professional was $106 in 2003, this accounted for nearly $80 million in Medicare charges for anesthesia assistance (AA) associated with colonoscopy in 2003 (more than double that of 2001).[15] Liu and colleagues estimated that the national expenditures on AA for both upper endoscopy and colonoscopy in 2009 were $129 million for Medicare beneficiaries and $945 million for commercially insured patients.[13] In light of the importance of controlling health care expenditures, utilization of expensive adjunct services is coming under increasing scrutiny. Therefore, the aim of this study was to determine the patient and provider characteristics that are associated with use of AA during outpatient colonoscopy. Our secondary aim was to determine whether use of AA was associated with colonoscopy interventions and outcomes, including whether polyps were diagnosed, polypectomy or biopsy was performed, or complications occurred.

Methods

We conducted a retrospective cohort design study using a 20% nationally representative sample of Medicare administrative claims. We included Medicare beneficiaries age 66 years and older who had a colonoscopy claim submitted during calendar year 2003. To identify baseline comorbidity and subsequent complications of colonoscopy, beneficiaries were excluded if they were not eligible for both Medicare Part A and Part B for the entire 12 months before and 12 months after the index colonoscopy, or if they were enrolled in a Medicare health-maintenance organization any time within the 12 months before and 12 months after the index colonoscopy. For this study, we included data for only the first colonoscopy claim submitted for each patient during 2003. Colonoscopy claims were identified using relevant Healthcare Common Procedure Coding System and Current Procedural Terminology (CPT) codes from the Carrier and the Outpatient Files, which contain claims for physician services (Healthcare Common Procedure Coding System codes G0121, G0105; CPT codes 45378, 44388, 45380, 44389, 45384, 44392, 45385, 44394, 45382, 44391, 45379, 45381, 45383, 45384, 45386, 45387, 44390, 44393, 44397). Diagnoses were ascertained using the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9) diagnostic codes associated with the colonoscopy and earlier claims.

The provider performing the colonoscopy was identified using the Unique Physician Identification Number on the colonoscopy claim, which was linked to the American Medical Association's Physician MasterFile to identify relevant provider-related variables, including physician age, years in practice, and specialty or subspecialty training.[16] Providers were classified as gastroenterologists, general surgeons, colorectal surgeons, internists, family physicians, or other according to the primary or secondary specialty in the American Medical Association MasterFile, as described in our previous work.[17]

Using the provider's listed practice ZIP code in the American Medical Association MasterFile, provider practice location was designated as urban, large rural, small rural, or isolated rural according to the Rural Urban Commuting Area (RUCA) classification.[18] RUCAs classify ZIP codes depending on their population size and the strength of their commuting ties to larger cities and towns. As a proxy for each provider's overall annual colonoscopy volume, we used their total number of colonoscopy claims in the 20% Carrier File for 2003. We used the site of service variable on the colonoscopy claim to identify site of service. Because the indications for inpatient colonoscopy are quite different from those for outpatient colonoscopy, we included only examinations performed in an outpatient setting (hospital outpatient, ambulatory surgery center, office, or other outpatient).

We linked the index colonoscopy data to the Medicare Denominator File to obtain data about patient demographic characteristics, including patient age, sex, race, and state and ZIP code of residence. Using the ZIP code of residence, we classified patient residence into urban, large rural, small rural, and isolated rural according to RUCAs. From US Census data, we obtained the ZIP-code level median household income as an indicator of patient socioeconomic status.

We used diagnoses from the colonoscopy claims as well as the carrier and Medicare Provider Analysis and Review (MedPAR) claims in the 12 months before the colonoscopy to define patient comorbidity. Patient comorbidity was classified using Deyo's modification of the Charlson comorbidity index.[19]

Outcomes Measures

The primary outcome of this study was utilization of AA during colonoscopy as identified by CPT code 00810 on the same day as the colonoscopy. Secondary outcomes included diagnostic biopsy (CPT codes 44389, 44392, 45380 or 45384), polyp detection (ICD-9 code 211.3 and 211.4), colonoscopic polypectomy, and colonoscopic complications. We ascertained the performance of polypectomy through either codes for a snare polypectomy (CPT codes 44394 or 45385) or when codes for both a biopsy and an associated ICD-9 diagnosis of a polyp were present. Complications of colonoscopy included gastrointestinal bleeding (ICD-9 codes 578.1, 578.9, 995.89–998.13), perforation (ICD-9 569.83, 998.2), emergent or urgent hospitalization (identified from MedPAR codes) within 30 days of colonoscopy or emergency room visit within 30 days of the colonoscopy, regardless of diagnosis (identified from Medicare Part B files).

Colonoscopy Indication

Colonoscopy indication was classified using combinations of CPT/Healthcare Common Procedure Coding System codes on the colonoscopy claim, the ICD-9 diagnosis codes from the colonoscopy claim, and claims in the 6 months before the index colonoscopy, as described previously.[17] If colonoscopy indication could not be classified, the colonoscopy was excluded from analysis.

Data Analysis

Bivariate tests of association between provider or patient characteristics and use of AA were done using χ^2 tests for categorical variables. To account for clustering of outcomes by the individual provider, we developed a generalized estimating equation model with an independent correlation matrix to examine provider variables associated with AA. Provider characteristics of interest included specialty training, annual colonoscopy volume (by quartile), rural vs urban practice location, years in practice, and endoscopy site of service. We also adjusted for relevant patient characteristics, including patient age, race, sex, comorbidity, indication for colonoscopy, ZIP-code based median