Endoscopist fatigue estimates and colonoscopic adenoma detection in a large community-based setting CME

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Background and Aims: Endoscopist fatigue may impact colonoscopy quality, but prior studies conflict, and minimal data exist from community-based practices where most colonoscopies are performed.

Methods: Within a large, community-based integrated healthcare system, we evaluated the associations among 4 measures of endoscopist fatigue and colonoscopic adenoma detection from 2010 to 2013. Fatigue measures included afternoon versus morning colonoscopy and the number of GI procedures performed before a given colonoscopy, including consideration of prior procedure complexity. Analyses were adjusted for potential confounders using multivariate logistic regression.

Results: We identified 126 gastroenterologists who performed 259,064 total GI procedures (median, 6 per day; range, 1-24), including 76,445 screening and surveillance colonoscopies. Compared with morning examinations, colonoscopies in the afternoon were not associated with lower adenoma detection for screening examinations, surveillance examinations, or their combination (OR for combination, .99; 95% CI, .96-1.03). The number of procedures performed before a given colonoscopy, with or without consideration of prior procedure complexity, was also not inversely associated with adenoma detection (OR for adenoma detection for colonoscopies in the fourth quartile of fatigue based on the number of prior procedures performed vs colonoscopies performed as the first procedure of the day, .99; 95% CI, .94-1.04).

Conclusions: In a large community-based setting, adenoma detection for screening and surveillance colonoscopies were not associated with either time of day or the number of prior procedures performed by the endoscopist, within the range of procedure volumes evaluated. The lack of association persisted after accounting for prior procedure complexity. (Gastrointest Endosc 2017;85:601-10.)

Colorectal adenocarcinoma is the second leading cause of cancer death in the United States.[1] Colonoscopy is a diagnostic and therapeutic modality capable of detecting and removing adenomas (the precursor lesion), thereby preventing progression to adenocarcinoma. However, the practice of colonoscopy is operator-dependent, and repetitive activity may render endoscopists susceptible to mental and perceptual errors because of fatigue.

Reports have examined the relationships between measures of endoscopist fatigue and indicators of colonoscopic quality, such as adenoma detection rate and the percentage of screening colonoscopies detecting at least 1 adenoma.[2] A physician's adenoma detection rate is a benchmark of colonoscopic quality; it is associated with patients' subsequent risk of mortality from colorectal cancer,[3] and recommended detection

Abbreviations: CI, confidence interval; KPNC, Kaiser Permanente Northern California; OR, odds ratio; RVU, relative value unit.

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rates were recently increased to 20% or more for women and 30% or more for men.[4] However, most prior studies of endoscopist fatigue and colonoscopy quality were conducted in tertiary referral centers, included small numbers of colonoscopies, and had relatively few endoscopists. Only 2 prior studies were conducted in community-based settings where most colonoscopies are performed; 1 was in the United Kingdom[5] and the other included just 3 endoscopists.[6] No study has examined the relationship between fatigue and colonoscopy quality in a large community-based endoscopy setting within the United States, and no study has used highly standardized measures to account for the complexity of prior procedures, such as relative value units (RVUs), to better estimate the combination of both procedure volume and complexity as a surrogate measure of endoscopist fatigue.[7]

The aim of this study was to evaluate whether in a large community-based integrated healthcare delivery system in the United States, estimates of endoscopist fatigue at the time of a screening or surveillance colonoscopy were associated with the frequency with which an adenoma was detected during the examination. We evaluated 4 different measures of endoscopist fatigue, including time of day of the colonoscopy, total number of GI procedures before the colonoscopy, and 2 separate measures that incorporated both the total number of prior GI procedures and the prior procedure complexity.

METHODS

Study setting and oversight

This retrospective cross-sectional study was performed within Kaiser Permanente Northern California (KPNC), an integrated healthcare delivery system. KPNC serves approximately 3.8 million health plan members in urban, suburban, and semirural regions throughout northern California. The KPNC membership is diverse and similar in socioeconomic characteristics to the region's census demographics, including the proportion with commercial insurance and those with government-sponsored insurance because of older age or disability (Medicare) or low income (Medicaid).[8]

The study was approved by the KPNC institutional review board, which waived the requirement for informed consent. The listed authors had sole responsibility for the study design, data collection, decision to submit the manuscript for publication, and drafting of the manuscript. This study was conducted within the National Cancer Institute–funded Population-based Research Optimizing Screening through Personalized Regimens consortium (U54 CA163262), which conducts multisite, coordinated, transdisciplinary research to evaluate and improve cancer-screening processes.

Study design, eligibility criteria, and data sources

We evaluated whether multiple measures of endoscopist fatigue at the time of screening and surveillance colonoscopy examinations were associated with adenoma detection during the colonoscopy examinations. Endoscopists performed procedures at ambulatory or inpatient endoscopy centers. Colonoscopies were performed according to routine practice using high-definition scopes (almost all centers use Olympus equipment, Olympus Corporation, Tokyo, Japan) with images displayed on high-definition video monitors. Optical enhancement tools, such as narrow-band imaging or chromoendoscopy, were used at the discretion of performing providers and were available for most settings, although these are not routinely used during screening examinations for polyp detection. All identified polyps were retrieved per standard practice and sent for pathologic assessment. Documentation, orders, and patient instructions were completed in an EPIC-based electronic medical record (EPIC Systems Corporation, Verona, Wisc).

Although GI procedures vary in length, current scheduling includes approximately 6 patients per 4-hour block, with each patient scheduled for an EGD, colonoscopy, or both. Typically, gastroenterologists' days are divided between clinical/office and procedure-related work, although some days include both morning and afternoon procedure blocks. Patients were provided with a split-dose colonoscopy bowel preparation (eg, MoviPrep; Salix Pharmaceuticals, Inc, Raleigh, NC) and advised to follow the manufacturer's split-dose regimen: dose 1 the evening before the colonoscopy (10-12 hours before dose 2) and dose 2 the next morning, on the day of the colonoscopy (starting at least 3.5 hours before the colonoscopy).

Endoscopic procedures were identified from electronic medical records based on Current Procedural Terminology codes[9] and *International Classification of Diseases*, 9th revision procedure codes. We identified all colonoscopies performed at KPNC facilities between January 1, 2011 and December 31, 2013 among health plan members $\geq$ 50 years of age. For each colonoscopy performed, all other GI procedures performed by the gastroenterologist that same day were identified, including colonoscopies, EGDs, ERCPs, push or balloon-assisted enteroscopies, EUS examinations, luminal stent placements, flexible sigmoidoscopies, paracenteses, and liver biopsy sampling. This yielded an analytic sample of 76,445 screening and surveillance colonoscopies (46,297 screening and 30,148 surveillance) performed at 21 KPNC facilities by 126 gastroenterologists and a total of 259,064 GI procedures performed by these gastroenterologists on the days of the colonoscopy examinations.

Colonoscopy examination indication (ie, diagnostic, surveillance, or screening) was assigned using a validated algorithm from electronic consultation reports, clinical diagnoses, laboratory results, and prior pathology data.[10]