

# Gastroenterologist Specialist Care and Care Provided by Generalists—An Evaluation of Effectiveness and Efficiency

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**OBJECTIVE** In this era of cost containment, gastroenterologists must demonstrate that they provide effective and efficient care. The aim of this study was to evaluate the process and outcomes of care provided by gastroenterologists and generalist physicians (internists, family physicians, general surgeons) for GI conditions.

**METHODS:** We conducted a systematic literature review using a MEDLINE search of English language articles (January 1980 to September 1998). A total of 2157 articles were identified; 10 met inclusion criteria for systematic review. In addition, there were nine articles that described the results of physician surveys, and examined the process of care among gastroenterologists and generalist physicians.

**RESULTS:** Care provided by gastroenterologists for GI bleeding and diverticulitis resulted in significantly shorter length of hospital stay. Gastroenterologists diagnosed celiac disease more accurately than generalists, and more adequately diagnosed colorectal cancer and prescribed antimicrobials for peptic ulcer disease. There was no difference between gastroenterologists and generalists in terms of colonoscopy procedure time, and family physicians detected a greater number of cancers. Furthermore, there was no difference in the outcomes of gastroesophageal reflux disease therapy in patients seen by gastroenterologists, *versus* those educated by nurses. The survey articles suggested that gastroenterologists were more likely to test and treat for *Helicobacter pylori* in patients with peptic ulcer disease, and were more likely recommended for medical *versus* surgical therapy. Gastroenterologists had a lower threshold for ordering ERCP before cholecystectomy than surgeons, but had similar responses regarding indications for surgery in inflammatory bowel disease. Finally, primary care physi-

cians were less likely to associate symptoms of profuse watery diarrhea with cryptosporidium infection compared with gastroenterologists and infectious disease specialists.

**CONCLUSIONS:** We reached the following conclusions: 1) The results suggest that gastroenterologists deliver effective and efficient care for GI bleeding and diverticulitis and provide more effective diagnosis in certain disorders. 2) Studies are limited by retrospective design, small sample size, and lack of control groups. 3) To fully evaluate care by gastroenterologists, prospective comparisons with greater attention to methodology are needed. (*Am J Gastroenterol* 2003;98:21–28. © 2003 by Am. Coll. of Gastroenterology)

## INTRODUCTION

In this era of rapid change in our health care environment, and an emphasis on cost containment, gastroenterologists are increasingly required to demonstrate both the value and the quality of the care they provide. With the expansion of managed care models, and the restriction of access to subspecialists, there has been a proliferation of literature comparing generalist and specialist care for a variety of disorders, including diabetes, coronary artery disease, HIV infection, stroke, asthma, and rheumatic and musculoskeletal diseases (1–5). For most conditions, including asthma, HIV infection, and stroke (1–4), patients have been shown to have better outcomes when cared for by a specialist. However, the cost of care is higher. Other studies examining the outcomes of patients with hypertension and noninsulin-dependent diabetes mellitus do not show an advantage for subspecialty care (1). In response to the demands of our rapidly changing health care environment, we performed a

**Table 1.** Search Strategy for Computerized Bibliographic Databases

Physician Specialty Concept	Gastrointestinal Condition Concept	Limits and Databases
Physicians, family/ exp physician's practice patterns/ gastroenterology/ family practice/ internal medicine/ "referral and consultation"/ specialties, medical/ specialties, surgical/ surgery/ exp attitude of health/ personnel/ exp "outcome and process assessment (health care)"/ pediatric/ or/1-12	exp colonic neoplasms/ exp colonoscopy/ occult blood/ diverticulitis, colonic/ diverticulosis, colonic/diverticulitis/ diverticular disease\$.tw. dyspepsia/ dyspep\$.tw. exp gastrointestinal hemorrhage/ "gi bleed\$.tw. gastrointestinal hemorrhage.tw. gi hemorrhage.tw. bleeding ulcer.tw. "Inflammatory Bowel Diseases"/crohns\$.tw. "ulcerative colitis".tw. exp hepatitis, chronic/ chronic viral hepatitis.tw. chronic hepatitis b.tw. chronic hepatitis c.tw. chronic hepatitis type b.tw. chronic hepatitis type c.tw. type b chronic hepatitis.tw. chronic type b hepatitis.tw. chronic type c hepatitis.tw. chronic non-a non-b hepatits.tw. chronic hepatitis non-a non-b.tw. chronic hepatitis type non-a non-b.tw. non-a non-b chronic hepatitis.tw. <i>helicobacter</i> infections/ exp peptic ulcer/ <i>helicobacter pylori</i> .tw. <i>h pylori</i> .tw. gastric ulcer\$.tw. duodenal ulcer\$.tw. peptic ulcer\$.tw.	Limit to English language Databases MEDLINE Healthstar CINAHL

Search terms shown as used in the OVID databases.

"/"at the end of a term denotes a MeSH heading.

exp denotes explode the term.

.tw. at the end of a term or terms denotes a text string search.

"\$" character indicates any (or no) character may occur in the location for text string searching.

To be selected, citations had to be coded with one of the physician specialty concept terms (column 1) and one of the gastrointestinal condition concept terms (column 2).

systematic review of the literature to evaluate and compare the process and outcomes of care provided by gastroenterologists and generalist physicians (internists, family physicians, and general surgeons) for GI conditions including inflammatory bowel disease, GI bleeding, diverticulitis, viral hepatitis, dyspepsia, *Helicobacter pylori* (*H. pylori*) infection, and for colorectal cancer screening.

## MATERIALS AND METHODS

We performed a systematic literature review to examine the care provided by gastroenterologists and generalist physicians (internists, family physicians, and general surgeons) for seven specific GI conditions including inflammatory bowel disease, GI bleeding, diverticulitis, viral hepatitis, dyspepsia, *H. pylori* infection, and for colorectal cancer screening. These conditions were chosen because we believed that they were representative of conditions that might be managed by either gastroenterologists or generalist physicians.

### Data Sources

In collaboration with the Duke Evidence-Based Medicine Center, we performed a structured MEDLINE search of English-language articles and abstracts published between 1980 and 1998, and restricted our search to human subjects. A prespecified set of search terms (Table 1) was applied to each of the seven topic areas. The search terms addressed specialty, practice patterns, referral and consultation, and attitude of health personnel. We also explored differences in adult and pediatric care by specialty for each disorder. To ensure complete ascertainment, the search was supple-

mented by a hand search of the bibliographies of all pertinent original and review articles.

### Study Selection

Inclusion and exclusion criteria were determined *a priori*. We included English-language articles that were published in full manuscript form and that were limited to the care of adult patients. Only articles that examined the effect of specialty on the process and outcomes of care, including outpatient visits, length of stay, costs, number and type of medications, endoscopic procedures, surgeries, days of work lost because of illness, quality of care, health-related quality of life, and health care use were included. Two reviewers applied the explicit inclusion criteria to each of the titles, abstracts, and manuscripts identified. Disagreements were resolved by group consensus.

### Data Abstraction and Analysis

Two physicians performed data abstraction in duplicate. For studies meeting the inclusion criteria, the following data were abstracted on standardized data abstraction forms:

Site of care (inpatient vs outpatient), specialty of the care giver, health care system (private, fee for service, health maintenance organization), description of the patient population (*e.g.*, age and gender), study design (prospective vs retrospective), level of evidence (randomized trial, case-control study, case series), outcome measures, type of statistical analysis, and results. For articles that reported the results of survey data, we listed the type of survey conducted (telephone, postal, face-to-face interview), the survey population, the sampling technique, the time period of

**Table 2.** Selection Process for Literature Review

Step in Literature Review Process	Citations n (%)
Citations identified by bibliographic databases, referenced citations, etc, titles and/or abstracts reviewed	2157
Included based on review of titles and/or abstracts and subject to full-text review	65 (3.0)
Met all criteria based on full-text review and included in analysis	19 (0.8)

the survey, and its location (US vs non-US), the demographics of the survey population, and the outcomes measured.

We did not apply a quality filter to our review process. We sought all empirical research that reported the pertinent outcomes listed above. With the many, diverse methodologies, it would be difficult to rate study quality using any existing scale. Data were summarized using descriptive statistics, and the articles were summarized by topic.

## RESULTS

We identified 2157 articles: 684 (31.7%) addressed the topic of colorectal cancer screening; *H. pylori* infection was the topic of 568 (26.3%); GI bleeding was the subject of 315 articles (14.6%), whereas inflammatory bowel disease was the subject of 303 (14.0%) of the articles; the remaining topics included hepatitis B and C infection, 243 (11.3%), dyspepsia, 176 (8.2%), and diverticular disease, 61 (2.8%). Because some articles were pertinent to more than one topic, they are counted twice. Thus, the numbers sum to 2350, and the sum of the percentages is 108.9% instead of 100% (Table 2). Ten articles met the inclusion criteria for the systematic review. The topics of these articles were: GI bleeding (1, 6), diverticulitis (1, 7), endoscopic procedures (colonoscopy for screening or symptoms) (3, 8–10), successful diagnosis of celiac disease (1, 11), compliance with guidelines (3, 12–14), and gastroesophageal reflux disease (GERD) (1, 15). There were seven retrospective (6, 7, 9–12, 15) and three prospective studies (8, 12, 14). The outcomes measured in these 10 studies included hospital length of stay (20%), cost of hospitalization (30%), use of procedures and their complications (30%), hospital readmission (10%), adequacy of provider follow-up of a positive fecal occult blood test (10%), accuracy of diagnosis (10%), and antimicrobial prescription rate (10%). The agreement among authors was 100% for final sample inclusion/exclusion status and 90% for specific data items extracted from the studies.

## SUMMARY OF ARTICLES (PUBLISHED SERIES)

### GI Bleeding

In a retrospective study examining the care provided by gastroenterologists, general surgeons, and family physicians for patients with GI bleeding (6), patients were admitted to one of five possible in-patient services (Med 1, Med 3, GI, Surg 1, or Surg 2). Patients were stratified as to the risk of

rebleeding and mortality using the Rockall Risk Score (16). Care provided by gastroenterologists resulted in a significantly shorter length of hospital stay (2 days for patients on the GI service vs 5 days for all other patients), ( $p < 0.05$ ). The difference persisted even after the censoring of patients who underwent surgery. The median cost of hospitalization was \$4381 for all patients. Costs were lower, however, for patients admitted to the gastroenterology service (\$2856), than for patients admitted to other services. Patients admitted to the GI service were actually found to have more severe disease compared with the other four inpatient services. Specifically, no patients admitted to the GI service were considered to be “low risk” by the Rockall score, whereas 4.5% were categorized as “high risk.” Thus, despite having sicker patients, the GI service appears to have provided more efficient care at significantly lower costs. Although the time from admission to endoscopy was not different among the services, the time from endoscopy to discharge was significantly shorter for patients on the gastroenterology service compared with other services (risk ratios ranged from 0.2 to 0.402) (6).

### Diverticular Disease

In a retrospective study, patients with diverticulitis (7) who were cared for by gastroenterologists had a shorter length of hospital stay ( $7.4 \pm 6$  days) when compared with patients cared for by internists ( $8.6 \pm 7$  days) and family physicians ( $7.9 \pm 14$  days), ( $p < 0.0001$ ). On average, the hospital stay of patients cared for by gastroenterologists was 1.2 days shorter than patients who received care by internists and 0.5 days shorter than those cared for by family physicians. Colonoscopy was performed significantly more often in patients of gastroenterologists (22.1%) than in patients of internists (12.3%) or family physicians (9.4%) ( $p < 0.0001$ ). However, it was not possible to evaluate comparability of patients colonoscoped by gastroenterologists versus nongastroenterologists. Those data were not provided. Abdominal CT was used significantly less often by family physicians compared with gastroenterologists and internists ( $p < 0.003$ ). Although barium enema was performed significantly less often by gastroenterologists, the rate of colonic resection (left colon) was no different among physician groups. Complications and 30-day mortality were similar among the groups. However, average reimbursement per patient per hospitalization was significantly lower for family physicians (\$3588) compared with gastroenterologists (\$4043) and internists (\$4075) ( $p < 0.0001$ ) (7).

### Endoscopic Procedures

Three studies compared the procedural capabilities of different provider types (8–10). With regard to competency in performing colonoscopy, a retrospective comparison of gastroenterologists, surgeons, and family physicians found no differences among gastroenterologists and family physicians in the proportion of successful cecal intubations or the polyp detection rate in patients referred for colonoscopy.

However, family physicians had a significantly shorter procedure time (36 min vs 44 min) than gastroenterologists ( $p < 0.05$ ) and detected more cancers (12 vs one) than gastroenterologists ( $p < 0.05$ ) (9). A prospective study examined the outcomes of flexible sigmoidoscopy among general surgeons, registered nurses, and gastroenterology fellows in patients referred for flexible sigmoidoscopy (8). There was no difference among providers (general surgeons, registered nurses, and GI fellows) regarding patient satisfaction for flexible sigmoidoscopy, although GI fellows had a significantly greater depth of insertion (54.9 cm), compared with nurses (53.9 cm) or general surgeons (50.11 cm) ( $p < 0.01$ ), and nurses had a significantly longer procedure duration (mean  $8.3 \pm 3.2$  min), compared with surgeons ( $7.6 \pm 6$  min) or gastroenterology fellows ( $6.8 \pm 3.4$  min). There were also no differences in the number of adenomas detected (8). In addition, a retrospective case series of patients with colorectal cancer who had undergone colonoscopy within 3 yr of diagnosis found that gastroenterologists were more likely to detect colon cancer at the time of colonoscopy compared with family physicians, general internists, and general surgeons. Failure to detect cancer was noted in 2.7% of gastroenterologists and 13% of generalist physicians. The OR for failed detection by nongastroenterologists compared with gastroenterologists was 5.36 (95% CI = 2.94–9.77) (10).

#### **Compliance With Practice Guidelines**

In a retrospective 3-yr study evaluating use of antimicrobials for individuals with peptic ulcer disease, gastroenterologists were more likely to prescribe antimicrobials according to National Institutes of Health (NIH) guidelines (15.7%) (17) than were primary care physicians (9.6%) or other specialists (10.4%) ( $p < 0.001$ ). There was, however, a significant increase in antimicrobial prescriptions for peptic ulcer disease from the base year to the year after the release of the NIH guidelines for all physicians studied (12).

A prospective comparison of colorectal cancer screening practices in a community setting revealed that gastroenterologists were more likely to conform to the American Cancer Society Guidelines for colorectal cancer screening and the follow-up of a positive fecal occult blood test (85%) than family physicians (45%) or other physicians (surgeons, gynecologists, obstetricians) (55%) ( $p < 0.03$ ) (13).

One study investigated the appropriateness of upper endoscopy in patients referred to an open access system, based on the guidelines of the American Society for GI Endoscopy. The study compared the appropriateness of patients referred for upper endoscopy by gastroenterologists, internists, and general surgeons. The investigators found that, overall, 84% of the indications for upper endoscopy were appropriate according to the American Society for GI Endoscopy guidelines. By specialty, 85% of gastroenterologists were likely to refer appropriately, compared with 87% of surgeons and 81% of internists. Internists were less likely than gastroenterologists or surgeons to refer appropriately ( $p$

$< 0.0004$ ) (14). Overall, there were malignant or premalignant findings, or findings that explained the patients' symptoms in 59% of the procedures. By specialty, the patients of 62% of gastroenterologists, 63% of surgeons, and 52% of internists had positive findings (15).

#### **Accuracy of Diagnosis**

A retrospective comparison of internists, surgeons, and gastroenterologists found that gastroenterologists more accurately diagnosed celiac disease (85%) compared with internists (63%), surgeons (7%), and other physicians. Furthermore, gastroenterologists more successfully diagnosed celiac disease at the time of the first referral (88%) compared with internists (12%) (11).

#### **GERD**

A prospective controlled trial alternately assigned patients to a nurse-supervised standardized educational class and to consultation with a gastroenterologist. The study examined patient compliance with keeping appointments and recommended antireflux therapy, frequency and severity of heartburn, patient assessment of response to recommended therapy, and compliance with recommendations. The study found that patients assigned to the gastroenterologist were more likely to keep their appointment (93% vs 64%) ( $p < 0.01$ ). Although there was no difference in the groups regarding their response to recommended therapy (measurements obtained at 2 wk and 2 months,  $p > 0.05$ ), at baseline the consultation group had more frequent heartburn than those assigned to the class ( $4.4 \pm 0.8$  vs  $2.4 \pm 0.3$  episodes daily,  $p < 0.02$ ) (15).

#### **Surveys**

Nine articles described the results of physician surveys. The topics of the survey articles included *H. pylori* infection (5, 8–22), peptic ulcer disease (1, 23), common bile duct stones and the use of ERCP before surgery (1, 24), indications for surgery and strategies for cancer screening among patients with inflammatory bowel disease (1, 25), and cryptosporidium infection (1, 26). These nine articles examined the process of care among gastroenterologists and generalist physicians. The process of care refers to the manner in which physicians practice medicine, including their decision-making patterns, adherence to guidelines, referral practices, and choice of management strategy. Six of these articles were from the United States or Canada (17, 19, 21, 23–25), and the remaining three were from European centers (18, 20, 22). There were no patient surveys identified that described attitudes toward gastroenterologists or generalist physicians. Likewise, there were no surveys identified that examined patient satisfaction with their care.

### **SUMMARY OF SURVEY ARTICLES**

#### **H. pylori Infection**

The surveys regarding *H. pylori* infection were mailed to physician members of professional medical societies in Eu-

rope and the United States. The surveys were conducted during a period in which the association between peptic ulcer disease and *H. pylori* infection was becoming widely known, and consensus statements indicated that patients with peptic ulcer disease should be tested for *H. pylori* infection, and treated if positive (17). The questions primarily addressed physician decisions to evaluate and treat *H. pylori* infection in patients with peptic ulcer disease. Alternative treatment regimens were also examined (17–19, 21). The surveys revealed that gastroenterologists were more likely to test patients with peptic ulcer disease for *H. pylori* infection and to treat if infection was demonstrated (17–19, 21). In addition, gastroenterologists were more likely to use the more efficacious triple therapy regimens (a proton pump inhibitor plus two antibiotics) when compared with internists, pediatricians, family physicians, or general practitioners (17–19). One survey evaluated the timing of the first use of antibiotic therapy to eradicate *H. pylori* infection in patients with peptic ulcer disease in relation to the release of the NIH consensus report on *H. pylori* and peptic ulcer disease (20). The goal of the survey was to examine the rate at which gastroenterologists adopted therapy for *H. pylori* infection relative to family physicians and general internists. The median time for adoption of therapy for *H. pylori* was 21 months earlier for gastroenterologists compared with primary care physicians. The relative risk for early adoption for gastroenterologists compared with family physicians was 3.83 ( $p < 0.001$ ). In a Cox regression model, characteristics that were associated with earlier adoption included male gender and board certification (among all physicians). Among primary care physicians, those in a multispecialty group or on full-time hospital staff adopted therapy for *H. pylori* earlier (20).

### **Peptic Ulcer Disease**

A survey of gastroenterologists and GI surgeon attendees to the Canadian national meeting of the American Gastroenterological Association (Toronto, Canada, 1997), elicited physician recommendation for elective surgery *versus* medical management for patients with bleeding duodenal ulcers. The authors identified potential determinants of the decision for surgery and measured decision making among gastroenterologists and surgeons. Medical *versus* surgical management of these patients may be based on a variety of factors including patient age, duration of bleeding, and transfusion requirement. The survey found that surgeons recommended surgery more often than gastroenterologists (65% *vs* 42%,  $p < 0.01$ ), although gastroenterologists and surgeons showed similar patterns in the use of the three determinants evaluated in the survey: transfusion requirement, duration of peptic ulcer disease, and patient age (23).

### **Common Bile Duct Stones**

Many potentially useful indicators of the presence of common bile duct stones in patients with suspected acute cholecystitis are reported in the literature. Shea *et al.* used the

American Medical Association physician masterfile to query gastroenterologists and surgeons on the relative importance of eight selected indicators of common bile duct stones (age, history of jaundice, history of pancreatitis, serum ALP, serum amylase, serum total bilirubin, serum ALT, and common bile duct diameter on ultrasound), in the decision to order a preoperative ERCP in patients with suspected acute cholecystitis (24). The level of serum bilirubin and the diameter of the common bile duct on ultrasound were the two most important indicators rated. Gastroenterologists rated the diameter of the common bile duct as more important, whereas surgeons rated the level of serum bilirubin to be more important. The threshold for the likelihood of a common bile duct stone that would trigger a recommendation for an ERCP was significantly lower for gastroenterologists than for surgeons (34.8% *vs* 41.6%,  $p = 0.0012$ ) (24).

### **Inflammatory Bowel Disease**

In a 1979 postal survey of selected gastroenterologists and surgeons in the United States and the United Kingdom, Kirsner examined the indications for and type of surgery recommended for patients with inflammatory bowel disease, the management of medical and surgical complications of the disease including liver disease, pyoderma gangrenosum, obstructed ureter, small bowel obstruction, perirectal disease, and screening for cancer (25). The goal of the study was to obtain current medical and surgical opinions on important therapeutic issues as a useful approach to improve our understanding and management of inflammatory bowel disease. Gastroenterologists and surgeons had similar responses regarding indications for surgery in inflammatory bowel disease patients. For each medical complication, however, compared with gastroenterologists, surgeons responded more often that surgery might be indicated. There were two indications for which the majority of gastroenterologists and surgeons both recommended surgery, obstruction of the ureter in patients with Crohn's disease (81% of gastroenterologists and 64% of surgeons), and perirectal disease in Crohn's patients (90% of gastroenterologists and 92% of surgeons). However, surgeons tended to indicate surgery more often. Screening practices for cancer in inflammatory bowel disease patients were similar among gastroenterologists and surgeons with 100% of each group recommending annual review (25).

### **Cryptosporidium Infection**

A final survey concerned physician awareness of cryptosporidium infection and knowledge of laboratory testing for cryptosporidium oocysts (26). The survey was sent to a random sample of Connecticut physicians (internists, gastroenterologists, infectious disease specialists, pediatricians, and family or general practice physicians). The results suggested that primary care physicians were less likely to associate symptoms of profuse watery diarrhea with cryptosporidiosis than specialist physicians (67% *vs* 90% for

gastroenterologists and 98% for infectious disease specialists,  $p < 0.05$ ), suggesting incomplete knowledge regarding this enteric pathogen. Nearly all respondents knew that AIDS was associated with an increased risk for cryptosporidium infection, and infectious disease specialists were more likely than all others to order cryptosporidium testing. Furthermore, caring for AIDS patients was a stronger predictor of ordering tests for cryptosporidium than was medical specialty (26).

## DISCUSSION

In the era of managed care, capitated and integrated delivery systems are sharing risk with provider groups, asking primary care practitioners to serve as gatekeepers by limiting and in some cases restricting subspecialty referrals. Although this strategy may result in reduced costs, there is evidence that the quality of care may suffer, particularly for patients with complex medical conditions (7, 27–32). The objective of this study was to evaluate the process and outcomes of care delivered by gastroenterologists compared with other practitioners. Although several reports were identified in the published literature, there is a dearth of well-designed studies measuring the outcomes of care for patients with digestive diseases delivered by different provider types.

The findings of this study reveal that in many instances, gastroenterologists provide high-quality care in the dimensions of care that are associated with improved outcomes, such as adherence to cancer screening and treatment recommendations. In other instances, care delivered by gastroenterologists may result in improved efficiency of care, such as the reduced length of stay noted in the care of patients with diverticulitis and GI hemorrhage. To the contrary, studies did not reveal superior performance of gastroenterologists in colonoscopy and flexible sigmoidoscopy. However, the one study that evaluated the detection of colon cancer found that the risk of nondetection was significantly greater with nongastroenterologists. Overall, gastroenterologists performed as well or better than other provider types for 91% (21 of 23) of process or outcome measures, and outperformed other provider types in 52% (12 of 23) of process or outcome measures. For 39% (nine of 23) of process or outcome measures, it was either unclear which group had superior performance or there was no difference between the comparison groups (Table 2).

There were only three prospective studies identified in the systematic review (8, 13, 15). One study found similar outcomes in terms of patient satisfaction and adenoma detection for flexible sigmoidoscopy performed by nurses, surgeons, and gastroenterology fellows. Another study found improved adherence to colorectal cancer screening by gastroenterologists, and the third revealed that a nurse-supervised class in GERD resulted in similar outcomes as care delivered by gastroenterologists.

The studies outlined in this review were limited, in general, by small numbers of patients, inadequate adjustment for severity of illness, and comorbidities among the patient groups, and were lacking descriptions of the level of training and experience of physicians. The majority of the studies (70%) were retrospective and not randomized. The surveys were limited by inadequate descriptions of the survey development process (90%) (17–22, 24, 25), incomplete descriptions of the sampling process and response rate and, in some surveys, formal statistical comparisons of the results were lacking (17, 19).

Why have so few studies evaluated the impact of care delivered by subspecialists? First, until the era of managed care and restricted access to subspecialists, there has been no significant imperative to demonstrate the effectiveness or “value” of services provided by gastroenterologists. Second, for most gastroenterological conditions, including GI hemorrhage and acute biliary disease, care has been traditionally delivered by primary care providers, surgeons, and gastroenterologists working in parallel or in sequence, making it difficult to discern the impact of the gastroenterologist in isolation. Finally, there are significant methodological challenges in evaluating the effectiveness and “value” of specialty care.

To clearly elucidate the impact of provider type on health care outcomes, prospective randomized trials are needed to avoid selection bias and balance patient characteristics that may impact outcomes, particularly severity of illness. Because practice setting, method of payment, and various financial incentives may impact the provision and the outcomes of care, these variables must be well described and adequately controlled for in the analyses. Additionally, outcomes and resource use should be measured by blinded observers using validated or standardized instruments. Well-designed retrospective analyses may reach valid conclusions if appropriate attention has been paid to ascertainment bias, severity adjustment, controlling for confounding and controlling for temporal trends (33).

Most importantly, however, to draw inferences about the quality of care delivered to patients with different provider types, the processes of care, or quality indicators, must be well known and well defined. Surveys about the process of care are most appropriate when a standard management strategy has been established based on valid evidence. For example, the threshold for the likelihood of a common bile duct stone to trigger an ERCP was lower for a gastroenterologist than a surgeon; is this good or bad? In patients with diverticulitis, colonoscopy was used more often by gastroenterologists than general internists; is this optimal care? In these instances, clear standards of care do not exist, thus obviating the value of self-reported process of care. Additionally, the validity of providers' self-reports about their own behaviors has not been well established.

Although the data are limited, the results of this analysis suggest that gastroenterologists may provide effective and efficient care compared with other provider types in upper

GI hemorrhage, diverticulitis, colorectal cancer screening, detection of celiac disease and cryptosporidiosis, the use of endoscopy and *H. pylori* treatment, and the management of inflammatory bowel disease. There was no evidence to document meaningful differences in GERD care, or procedural competence with colonoscopy/flexible sigmoidoscopy. Moreover, because we only included articles published in the English language, some existing studies may have been overlooked.

With growing emphasis on the quality and efficiency of care, the debate about specialist *versus* generalist care is likely to intensify. As evidence has emerged regarding the improved quality of care provided by subspecialists (29, 31), managed care organizations are beginning to relax restrictions on specialist care. Rigorous prospective studies are urgently needed to establish improvements in the process and outcomes of care when delivered by gastroenterologists to bring the debate to closure.

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