

Esophagogastroduodenoscopy Performed by a Family Physician

A Case Series of 793 Procedures

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BACKGROUND. Primary care physicians are performing an increasing number of gastrointestinal endoscopies. The purpose of this research is to present a large case series of diagnostic esophagogastroduodenoscopies (EGDs) performed by a family physician in a solo rural practice.

METHODS. We present a retrospective chart review, including demographic characteristics, indications, endoscopic and pathologic findings, and complications for every EGD performed by a family physician over a 7-year period.

RESULTS. Seven hundred ninety-three EGDs were performed on 602 patients (421 women, 181 men), with a mean age of 51.8 years. In 99% of procedures, the second portion of the duodenum was intubated. The most common indications for EGD were abdominal pain (60.5%), gastrointestinal bleeding (23.0%), dysphagia (11.6%), and heart-burn (10.7%). A total of 451 biopsies were obtained in 385 procedures, mostly from the distal esophagus (38%) or gastric antrum (37%). Common endoscopic diagnoses were gastritis (54%), esophagitis (25%), and normal study (15%). There were only two malignancies detected, one gastric lymphoma and one carcinoma metastatic to the stomach. One minor complication (0.13%) occurred, an immediate urticarial rash after intravenous meperidine.

CONCLUSIONS. Experienced family physicians can safely and competently perform diagnostic EGD and provide this important service to their community.

KEY WORDS. Esophagogastroduodenoscopy; physicians, family. (*J Fam Pract* 1998; 46:41-46)

As the practice of medicine has progressed, technical procedures such as gastrointestinal endoscopy have become despecialized.¹ For example, flexible sigmoidoscopy is now performed by 29% to 57% of US family physicians and 42% of general internists, according to recent national surveys.^{2,4} Esophagogastroduodenoscopy (EGD) has become the primary diagnostic tool for evaluation of upper gastrointestinal symptoms.^{4,7} Primary care physicians perform EGD considerably less often than flexible sigmoidoscopy, and physicians may find it difficult to acquire endoscopic skills after residency training.⁸⁻¹⁰

In Great Britain, a national group representing endoscopy experts has recently given their endorsement to general practitioners' learning and performing diagnostic EGD in the office setting.⁷ Gastroenterologists at the Ochsner Clinic in New Orleans have trained a physician assistant to do EGDs in their setting; details of 178 procedures have been reported.¹² Part of the controversy over procedural competence may relate to the much higher reimbursement when the procedure is done in the hospital or a surgical center compared with a private office.^{13,14} Another controversy relates to the role of EGD in the evaluation of dyspepsia; American guidelines suggest empirical treatment in most cases, resorting to EGD only for persistent symptoms or failed therapy, while some European experts recommend doing EGD early in otherwise healthy patients with these symptoms.^{6,15-17} As many as 1% of some populations may have endoscopy each year, and access to this technology can be a problem, particularly in rural areas.⁶ Some experts recommend that rather than training primary care

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physicians to do EGD, the procedure should be made available on demand, similar to the way a primary care physician orders a CT scan or bone marrow biopsy.^{5,18-22}

We report a series of 793 EGDs performed by a single family physician (R.P.). At the time of the study, he was in solo practice of family medicine in a town in rural south Georgia with a county population of 32,000. His number of outpatient visits averaged 35 to 45 per day, and he saw 3 to 8 hospitalized patients per day. The practice provided the full spectrum of family medicine, except for obstetrical services. More than 80% of patient visits were by adults. This physician saw patients in the office, hospital, and in local nursing homes. He also had minor laboratory and radiologic services available in his office. A case series of 751 colonoscopies performed by this family physician was recently published in the *Journal*.²³

METHODS

All EGD procedures were performed in the endoscopy suites of two small hospitals in south Georgia between November 1988 and December 1995. Patients fasted overnight, then supplied their preoperative history, received a physical examination, and gave their informed consent. All patients received intravenous fluids; and pulse, blood pressure, and oxygen saturation were monitored during the procedure. Almost all patients received intravenous sedation. The first 150 procedures were performed with Olympus fiberscopes (Olympus Optical Co, Ltd, Tokyo, Japan), and the remaining EGDs were performed with Pentax videoscopes (Pentax Precision Instrument Corp, Orangeburg, NY), with images edited, formatted, and printed by Pentax's proprietary software. Unstable patients or those with brisk gastrointestinal bleeding were referred to other physicians, as were patients requiring therapeutic procedures such as dilation, injection of varices, or endoscopic retrograde cholangiopancreatography.

We performed a retrospective review of patients' charts and the endoscopy logbook for all procedures. Name, date of procedure, age, sex, and method of sedation were recorded for each patient. The indication(s) for EGD was noted. This family physician followed the accepted indications for EGD, in particular the 1985 American College of

Physicians guidelines on endoscopy in patients with dyspepsia, which suggest an empiric medication trial before EGD in most patients.¹⁵ The adequacy of patient preparation was subjectively rated by the endoscopist as excellent, fair, or inadequate. The depth of scope insertion and location of any lesions were recorded using the following locations: oropharynx, proximal esophagus, distal esophagus, gastric cardia, body of stomach, antrum, pylorus, first portion of duodenum, and second portion of duodenum. Endoscopic diagnoses were noted, and the location and pathologic diagnosis for each biopsy was noted. This physician's policy was to take biopsy samples of gastric ulcers at least six times, including samples of the edge and center of the ulcer. Biopsy samples were taken four to six times for other lesions, such as esophagitis or presumed Barrett's epithelium. Multiple biopsies of one anatomic lesion were counted as a single biopsy in this report. When the rapid urease test for the detection of *Helicobacter pylori* (*H pylori*) became available (CLO test, Delta West Pty, Ltd, Bentley, Western Australia), this technique was performed in selected patients with gastric ulcers, duodenal ulcers, or gastritis.²⁴ Finally, all complications were noted in the logbook and in the patients' records.

All data were entered retrospectively by a single research assistant over an 8-week period; no charts were missing or unavailable. Data was entered directly into a database program, using the Statistical Package for the Social Sciences (SPSS/PC+), which was also used for analysis. Differences in proportions were tested by the χ^2 critical ratio test.²⁵ Probability (*P*) values were adjusted using Holm's Sequential Rejective Algorithm for multiple comparisons.²⁶

RESULTS

Six hundred two patients (421, 69.9% women; 181, 30.1% men) underwent 793 EGDs during the 7-year period. Of the 602 patients, 471 had only one procedure, 87 had 2 procedures, 30 had 3, 12 had 4, and 2 had 5 procedures. The mean age of patients undergoing EGD was 51.8 years, with a range from 10 to 93 years. The age distribution was bimodal, with peaks at the age range of 41 to 45 years and again at the age range of 71 to 75 years. The frequency of EGDs ranged from 4 per month during the first year to a stable rate of 10 to 12 per month for the last 3 years.

TABLE 1

Indications for 793 EGDs Performed by a Family Physician

Indication	No. (%)
Abdominal pain, dyspepsia	480 (60.5)
Gastrointestinal bleeding	182 (23.0)
Dysphagia	92 (11.6)
Heartburn	85 (10.7)
Anemia	54 (6.8)
Abnormal UGI radiograph	38 (4.8)
Gastritis follow-up	33 (4.2)
Barrett's esophagus follow-up	18 (2.3)
Nausea, vomiting	15 (1.9)
Other indications	30 (3.8)
Total*	1027

*Total is >793 because individual procedures could have more than one indication. EGD denotes esophagogastroduodenoscopy; UGI, upper gastrointestinal.

Fifty-nine procedures were supervised by another physician before this family physician began performing EGD independently. Only 48 procedures (6.1%) were performed on inpatients; the remainder were outpatients. The vast majority (720, 90.8%) of EGDs were performed on patients followed by the physician in his private practice; the remaining 73 (9.2%) were referred by another physician. Of the 602 patients who underwent EGD, 254 (42.2%) also underwent colonoscopy by this family physician during the study period.

Intravenous sedation doses were recorded for 790 procedures. Midazolam was used in 785/790 cases (99.4%), at a mean dose of 3.8 mg (range 1 to 11 mg). Meperidine was used in 736/790 cases (93.2%), at a mean dose of 39.3 mg (range 12.5 to 100 mg). The mean midazolam dose fell 12.5%, from 4.0 mg in the first decile of patients to 3.5 mg in the final decile. The mean dose of meperidine fell more dramatically, from 52.5 mg in the first decile to 24.4 mg in the final decile, a 53.5% decline. A total of 105 patients also received naloxone.

In 785 cases (99.0%), the endoscope reached the second portion of the duodenum. Of the eight patients with incomplete endoscopic examinations, four had pyloric stenosis, and four had the procedure terminated early due to agitation. The adequacy of patient preparation was rated as excellent by the endoscopist in all cases.

There were 1027 indications for the 793 EGDs (Table 1). Abdominal pain, mostly dyspepsia despite medical therapy, was by far the most common indication (480 cases, 60.5%), followed by gastrointestinal bleeding (182 cases, 23.0%), dysphagia (92 cases, 11.6%), and heartburn (85 cases, 10.7%). The bleeding indications included 114 cases of melena, 46 cases of hematemesis, 14 cases where blood was noted at the cecum at colonoscopy, and 8 cases where the site of bleeding was not documented. Only 38 patients underwent EGD because of abnormal findings on an upper GI radiograph. There were no substantial differences between men and women regarding EGD indication, except that anemia was a more common indication in women (8.5%) than in men (2.7%, $P = .03$).

There were 451 biopsies taken during 385 EGDs. Of these 385 procedures, 325 had a single site biopsy sample taken, 54 had samples taken at 2 sites, and 6

had samples taken at 3 sites. In 408 cases (51.5%), there were no biopsies performed. The majority of biopsy samples were taken of either the distal esophagus (173, 38.4%) or the gastric antrum (165, 36.6%). In addition, a CLO test for *H pylori* was also performed in 323 procedures (40.7%). This test was positive in 120 of 323 cases (37.2%).

Endoscopic and pathologic diagnoses are recorded in Tables 2 and 3. The most common endoscopic diagnoses were gastritis (413 cases), acid esophagitis (195 cases), duodenitis (134 cases), and normal study (115 cases). Fifty-four patients had a gastric ulcer and 47 had a duodenal ulcer. More men than women had an endoscopic diagnoses of duodenitis (24.3% vs 13.9%, $P = .003$) and duodenal ulcer (11.1% vs 3.9%, $P < .001$).

A total of 546 pathologic diagnoses were provided for the 451 biopsies. The diagnosis of gastritis or antritis was the most common pathologic finding, accounting for 182 cases. Following this, the most common pathologic findings were esophagitis (98 cases), no diagnosis or normal tissue (59 cases), and histologic evidence of *H pylori* infection (54 cases). There were no substantial differences between men and women.

In 90 cases, the clinician made an endoscopic diagnosis of esophagitis and obtained a specimen for pathologic examination. In 70% of these cases, the

TABLE 2

Endoscopic Diagnoses Reported from 793 EGDs Performed by a Family Physician

Endoscopic Diagnosis*	No. (%)
Gastritis	431 (54.4)
Acid esophagitis	195 (24.6)
Duodenitis	134 (16.9)
No diagnosis (normal)	115 (14.5)
Hiatal hernia	77 (9.7)
Barrett's esophagus	58 (7.3)
Gastric ulcer	54 (6.8)
Duodenal ulcer	47 (5.9)
Other diagnoses	153 (19.2)
Total	1264

*Diagnoses outnumber procedures because some procedures have more than one endoscopic diagnosis
EGD denotes esophagogastroduodenoscopy.

TABLE 3

Pathologic Diagnoses of 451 Biopsies from 385 EGDs Performed by a Family Physician

Pathologic Diagnosis*	No. (%)
Gastritis, antritis	182 (40.4)
Esophagitis	98 (21.7)
No diagnosis (normal)	59 (13.1)
<i>Helicobacter pylori</i>	54 (12.0)
Barrett's esophagus	39 (8.6)
Ulceration	32 (7.1)
Duodenitis	32 (7.1)
Cytologic atypia	12 (2.7)
Malignancy	2 (0.4)
Other diagnoses	36 (8.0)
Total	546

*Diagnoses outnumber biopsies because some biopsies had more than one pathologic diagnosis.
EGD denotes esophagogastroduodenoscopy.

pathology report demonstrated esophagitis, in 12.2% the pathology report demonstrated Barrett's esophagus, and in 17.8% the pathologist reported normal tissue. In 123 cases, there was an endoscopic diagnosis of gastritis, with corresponding biopsies. The pathology report demonstrated gastritis in 83.7%, normal tissue in 15.4%, and cancer in 0.8%. Similarly, in 39 cases there was an endoscopic diagnosis of benign gastric ulcer that was confirmed by biopsy. The pathology report confirmed benign lesions in 96.4%; in one case (3.6%), the pathology report indicated a gastric lymphoma.

In 12 cases, a pathologic diagnosis of cytologic atypia was made. All of the atypia diagnoses were made by a single pathologist in the first 2 years of the study. This pathologist used the term atypia to describe reactive changes; none of these biopsies demonstrated dysplasia. Two to 7 years of follow-up failed to show any progression to malignancy among these patients. There were only two malignancies diagnosed during the entire study period: one gastric lymphoma and one carcinoma metastatic to the stomach.

A minor complication occurred in one (0.13%) of the 793 procedures. This patient experienced an immediate urticarial rash following intravenous infusion of meperidine. After treatment with intravenous diphenhydramine and dexamethasone, the rash promptly resolved, and the procedure was successfully completed. There were no other complications. One patient was referred immediately to a general surgeon. This patient had a duodenal vessel visibly pumping blood at EGD. A general surgeon on site was unable to stop the bleeding endoscopically. The patient underwent emergency surgery without complications.

DISCUSSION

In 1989, Wigton et al⁴ found that in a national survey of US general internists 7% performed EGD. The percentage rose to 15% in rural areas and was also higher in smaller hospitals. In a companion survey of internal medicine residencies, he also found that only 1% of internal medicine residents mastered EGD during residency; implying that most general internists doing EGD acquired the skill after residency training.⁹ In a

1993 survey of 2280 US family physicians, 2% were performing EGD in their offices, and 2.7% had hospital privileges for this procedure.³ Thomas and colleagues²⁷ reported in 1997 that 24% of US family practice residencies provide EGD training to their residents. Others have reviewed this technology for family physicians.²⁸⁻³⁰

There is limited literature on the performance of upper GI endoscopy by primary care physicians. Graham³¹ reported on 646 EGDs performed by general practitioners in rural Australia, and Woodliff³² reported on 166 procedures done by a family physician in this country; both series documented good diagnostic accuracy and an absence of complications. There are other case series by primary care physicians, with similar findings.³³⁻³⁵ In 1993, Rodney and colleagues^{36,37} reported the experiences of 13 family physicians across the United States who performed 2500 EGDs with a single complication (a patient required overnight observation for bleeding). This safety record occurred even though this series included the first EGDs performed by these physicians.

In the study reported herein, the complication rate (1 complication, 0.13%) compares favorably with those reported in the GI literature. In the largest series yet published, with over 210,000 procedures, Silvis and colleagues³⁸ reported an overall complication rate of 0.13%, with 0.008% deaths. Complications are more common when EGD is done to evaluate upper GI bleeding. In this group, Gilbert et al³⁹ found a complication rate of 0.9%, with 0.13% deaths.

Only two (0.3%) malignancies were found among the 793 EGDs reported in the present study. In eight EGD series from primary care settings, malignancy was reported in 0.4% to 3.4% of procedures.^{19-22,31-33,37} The low rate of malignancy in the present study is probably not the result of inadequate examination, because 99.0% of patients had complete examinations to the second portion of the duodenum. It is likely that patients selected for endoscopy by a primary care physician may be healthier than patients studied by other specialists.^{19,20} However, the major "soft" indication for EGD is dyspepsia, and this family physician endoscopist used the conservative 1985 American College of Physicians guideline on endoscopic evaluation of patients with dyspepsia, an algorithm which suggests empiric medical treatment before EGD in most cases.¹⁵

The rate of gastric ulcer (54 of 793 procedures, 6.8%) in our study compares with a range of 6% to 12% reported from other EGD case series in primary care settings. Similarly, the rate of duodenal ulcers (5.9%) compares with a range of 6% to 14% from these series.^{19-22,31-33,37} The vast majority of patients in the series in our study had received courses of antiulcer treatment, usually H₂-blockers, prior to EGD.

The most common indication for EGD in our study series was abdominal pain or dyspepsia. This corroborates data from other primary care series.^{22,33,37} In a study of EGDs performed on patients insured by Medicare, GI bleeding, an abnormal finding on a GI radiograph, and dysphagia were all more common indications than dyspepsia.⁴ As a physician gains more experience, follow-up procedures for gastric ulcer, gastritis, and Barrett's esophagus, for example, may become more common. One of the malignancies in this series was discovered at an EGD done to follow the healing of a gastric ulcer.

Testing for *H pylori* became widespread during this study; therefore, the impact of this organism in our series is likely underrepresented. We reported 120 CLO tests positive for *H pylori*, and the organism was documented by biopsy samples from 54 patients.

There is disagreement regarding the number of supervised EGDs needed to assure technical competence, with suggested numbers ranging from 7 to more than 100.^{4,40-43} Part of this wide range is likely related to the prior endoscopic experience of physicians. Primary care physicians who do EGD generally have generally had substantial prior experience with flexible sigmoidoscopy. General internists performing EGD estimate that 25 supervised EGDs are necessary to attain competence.⁸ Further, diagnostic EGD probably requires fewer supervised procedures than more complex procedures, including the treatment of bleeding ulcers, management of difficult strictures, and so forth.⁴⁴ The American College of Physicians,⁴³ for example, recommends 50 supervised procedures. We feel that primary care physicians experienced in flexible sigmoidoscopy can generally become technically competent in diagnostic EGD after 25 procedures. Clinicians with strong psychomotor skills may need even fewer supervised procedures.³⁷ Technical competence is only one aspect of performing EGD; cognitive skills such as recognition of pathologic states and complications,

appropriate disease management, and intravenous sedation skills are more difficult to evaluate.

CONCLUSIONS

This is the largest case series of EGD reported by a single primary care physician, and the complication rate compares favorably with the largest series in the GI literature.³⁸ The family physician in this study acquired all his endoscopic skills after residency training and now provides diagnostic upper GI endoscopic services for selected patients in his community.

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REFERENCES

- Nelsen DA Jr, Hartley DA, Christianson J, Moscovice I, Chen MM. The use of new technologies by rural family physicians. *J Fam Pract* 1994; 38:479-85.
- Buckley RL, Smith MU, Katner HP. Use of rigid and flexible sigmoidoscopy by family physicians in the United States. *J Fam Pract* 1988; 27:197-200.
- American Academy of Family Physicians. Facts about: family practice. Kansas City, Mo: American Academy of Family Physicians, 1994.
- Morrissey JF, Reichelderfer M. Gastrointestinal endoscopy. *N Engl J Med* 1991; 325:1142-9.
- Overholt BF, Hargrove RL, Farris RK, Porter FR. Primary panendoscopy. *Gastrointest Endosc* 1987; 22:1-3.
- Kahn KL, Kosecoff J, Chassin MR, Solomon DH, Brook RH. The use and misuse of upper gastrointestinal endoscopy. *Ann Intern Med* 1988; 109:664-70.
- Showstack JA, Schroeder SA, Steinberg HR. Evaluating the costs and benefits of a diagnostic technology: the case of upper gastrointestinal endoscopy. *Med Care* 1981; 19:498-509.
- Wigton RS, Nicolas JA, Blank LL. Procedural skills of the general internist. A survey of 2500 physicians. *Ann Intern Med* 1989; 111:1023-34.
- Wigton RS, Blank LL, Nicolas JA, Tape TG. Procedural skills training in internal medicine residencies. A survey of program directors. *Ann Intern Med* 1989; 111:932-8.
- Ackermann RJ. Performance of gastrointestinal tract endoscopy by primary care physicians. Lessons from the US Medicare database. *Arch Fam Med* 1997; 6:52-8.
- Working Party of the Endoscopy Section of the British Society of Gastroenterology. Gastrointestinal endoscopy in general practice. *Gut* 1994; 35:1342.
- Lieberman DA, Ghormley JM. Physician assistants in gastroenterology: should they perform endoscopy? *Am J Gastroenterol* 1992; 87:940-3.
- Larimore WL, Zuber TJ. Coding and reimbursement for gastrointestinal endoscopic procedures in primary care. *J Fam Pract* 1994; 39:153-9.
- Zuber TJ. RBRVS [letter]. *J Fam Pract* 1993; 37:537.
- Health & Public Policy Committee, American College of Physicians. Endoscopy in the evaluation of dyspepsia. *Ann Intern Med* 1985; 102:266-9.
- Axon ATR, Bell GD, Jones RH, Quine MA, McCloy RF. Guidelines on appropriate indications for upper gastrointestinal endoscopy. *BMJ* 1995; 310:853-6.
- Bytzer P, Hansen JM, Schaffalitzky de Muckadell OB. Empirical H2-blocker therapy or prompt endoscopy in the management of dyspepsia. *Lancet* 1994; 343:811-6.
- Jones R. Endoscopy in general practice. *BMJ* 1995; 310:816-7.
- Gear MW, Barnes RJ. Endoscopic studies of dyspepsia in general practice. *BMJ* 1980; 280:1136-7.
- Fisher JA, Surridge JG, Vartan CP, Loehry CA. Upper gastrointestinal endoscopy — a GP service. *BMJ* 1977; 2:1199-1201.
- Kerrigan DD, Brown SR, Hutchinson GH. Open access gastroscopy: too much to swallow? *BMJ* 1990; 300:374-6.
- Jones R. Upper gastrointestinal endoscopy — a view from general practice. *J R Coll Gen Pract [Occas Pap]* 1986; 36:6-8.
- Pierzchajlo RPJ, Ackermann RJ, Vogel RL. Colonoscopy performed by a family physician: A case series of 751 procedures. *J Fam Pract* 1997; 44:473-80.
- Cutler AF. Testing for *Helicobacter pylori* in clinical practice. *Am J Med* 1996; 20:35S-39S.
- Fleiss JL. Statistical methods for rates and proportions. 2nd ed. New York: John Wiley & Sons, 1981: p 23.
- Westfall PH, Young SS. Resampling-based multiple testing. New York: John Wiley & Sons, 1993: p 64.
- Thomas JM, Bredfeldt R, Easterling G, Massie M. Esophagogastroduodenoscopy training in family practice residency programs. *Fam Med* 1997; 29:572-4.
- Hocutt JE Jr, Rodney WM, Zurad EG, Tucker RS, Norris T. Esophagogastroduodenoscopy for the family physician. *Am Fam Physician* 1994; 49:109-16,121-2.
- Sgammato J. Should you be doing EGD? *Fam Pract Manage* 1994; 1:63-9.
- Norris TE. Office procedures. Esophagogastroduodenoscopy. *Primary Care* 1997; 24:327-40.
- Graham PW. Upper gastrointestinal endoscopy. Findings in an isolated rural general practice. *Aust Fam Physician* 1989; 18:703-7.
- Woodliff DM. The role of upper gastrointestinal endoscopy in primary care. *J Fam Pract* 1979; 8:715-9.
- Pope JB, Mayeaux EJ Jr, Harper MB. Effectiveness and safety of esophagogastroduodenoscopy in family practice: experience at a university medical center. *Fam Med* 1995; 27:506-11.
- Zuber TJ. A pilot project in office-based diagnostic esophagogastroduodenoscopy comparing two nonintravenous methods of sedation and anesthesia. *Arch Fam Med* 1995; 4:601-7.
- Cremins JE. Esophagogastroduodenoscopy in a small Army community hospital. *Mil Med* 1993; 158:90-1.
- Rodney WM, Hocutt JE Jr, Coleman WH, et al. Esophagogastroduodenoscopy by family physicians: a national multisite study of 717 procedures. *J Am Board Fam Pract* 1990; 3:73-9.
- Rodney WM, Weber JR, Swedberg JA, et al. Esophagogastroduodenoscopy by family physicians phase II: national multisite study of 2500 procedures. *Fam Pract Res* 1993; 13:121-31.
- Silvis SE, Nebel O, Rogers G, Sugawa C, Mandelstam P. Endoscopic complications. Results of the 1974 American Society for Gastrointestinal Endoscopy survey. *JAMA* 1976; 235:928-30.
- Gilbert DA, Silverstein FE, Tedesco FJ. National ASGE survey on upper gastrointestinal bleeding: complications of endoscopy. *Dig Dis Sci* 1981; 26:55S-59S.
- Deutchman D. One approach to describing the privileges of family physicians. *Proced Skills Office Tech* 1994; 7:100-1.
- Cass OW, Freeman ML, Peine CJ, Zera RT, Onstad GR. Objective evaluation of endoscopy skills during training. *Ann Intern Med* 1993; 118:40-4.
- Cass OW, Freeman ML, Cohen J, et al. Acquisition of competency in endoscopic skills (ACES) during training: early results of a multicenter study [abstract]. *Gastrointest Endosc* 1995; 41:317.
- Health & Public Policy Committee, American College of Physicians. Clinical competence in diagnostic esophagogastroduodenoscopy. *Ann Intern Med* 1987; 107:937-9.
- Susman J, Rodney WM. Numbers, procedural skills and science: do the three mix? *Am Fam Physician* 1994; 49:1591-2.