order, and recommend prokinetic agents. Unfortunately, there has been no large randomized controlled trial to answer these questions. In addition, most previous trials have been conducted with patients referred for endoscopy, which raises questions of referral bias and generalizability of the results to all primary care patients.

Population studied Patients who presented to general practitioners for dyspepsia of greater than 3 days duration were studied. Dyspepsia was defined as epigastric or retrosternal pain or discomfort, with or without other gastrointestinal symptoms. Patients underwent endoscopy within 1 week and were excluded if ulcer, esophagitis, or cancer was found, but not for minor abnormalities such as erythema or erosions. Other exclusion criteria included previously diagnosed ulcer or esophagitis, use of ulcer drugs or nonsteroidal anti-inflammatory drugs in the preceding month, suspected infection or serious disease, chronic disease, drug abuse, pregnancy, lactation, or the need for an interpreter.

Study design and validity This was a well-designed study. The design was a double-blind, randomized clinical trial in which patients were treated for 2 weeks with one of the following three therapies: cisapride 10 mg tid, given 30 minutes before meals; nizatidine 300 mg qhs; or placebo for 2 weeks. Randomization was stratified by four symptom subgroups (ulcer, reflux, dysmotility, and unclassifiable). Baseline characteristics were similar among all three groups.

Of the patients initially referred by 66 general practitioners, 40% were excluded on the basis of endoscopy results. Approximately half of the remaining patients were excluded because of other criteria; 330 patients were ultimately enrolled. Fifty-one patients withdrew, primarily because of noncompliance or adverse events, but they were evenly distributed among the 3 groups. Nine additional patients had incomplete data. The data were analyzed in a variety of ways, including intention-to-treat analysis, but the method of analysis did not alter the results.

Outcomes measured The primary outcome was a global assessment of symptoms on day 14 compared with day 0, and described as resolved, improved, unchanged, or worse. A secondary outcome was the number of symptom-free days in the second week according to a symptom diary.

Results Symptoms resolved or improved for 54% of patients in the nizatidine group and 62% of patients in the cisapride and placebo groups (P= ns). The number of symptom-free days was also not significantly different among groups, and the response to treatment did not vary by symptom subgroup. No drug was superior for improving specific symptoms of epigastric pain, heartburn, acid regurgitation, nausea, fullness, bloating, night pain, or irritable bowel syndrome. Individual symptoms or symptom subgroups were not predictive of the response to a specific drug or placebo. A multivariate analysis did find that certain symptoms predicted a better response to each drug. Patients with fullness, early satiety, pain aggravated by meals, and globulus sensation responded better to cisapride, while those with retrosternal pain, acid regurgitation, diffuse epigastric pain, and alcohol consumption responded better to nizatidine.

Recommendations for clinical practice **Neither an H_2-antagonist nor a prokinetic agent was more effective than placebo in the treatment of nonulcer dyspepsia; these patients tend to feel better after 2 weeks no matter what we do. Using a clinically based classification of symptoms to guide the choice of medication is not particularly helpful, either. It is important to remember that only 30% of the patients referred for the study were actually included in the study, and that patients with esophagitis or ulcer probably do benefit from these drugs.**

Alan Adelman, MD, MS
Brian S. Alper MD
Penn State University/Good Samaritan Hospital
Family Practice Residency Program
Hershey
E-mail:aadelman@psghs.edu

Identifying Cardiac Risk in Patients with Atypical Chest Pain

Colon PJ, Mobarek SK, Milani RV, et al. Prognostic value of stress echocardiography in the evaluation of atypical chest pain patients without known coronary artery disease. Am J Cardiol 1998; 81:545-51.

Clinical question **Is stress echocardiography better than stress electrocardiography for evaluating cardiac risk in patients with atypical chest pain?**

Background Stress electrocardiography (ECG) seeks evidence of ischemia by increasing cardiac load and looking for typical ECG changes. Stress echocardiography is a newer modality that identifies ischemia by detecting wall motion abnormalities under cardiac stress. It has not been extensively tested in patients with atypical chest pain. This article compares stress echocardiography and stress ECG in patients at low risk for heart disease.

Population studied Of the 1998 patients referred for stress echocardiography testing at this New Orleans cardiology department in 1993, 1310 (67%) were exclud-

ed due to a history of coronary artery disease (CAD), typical angina, valvular heart disease, cardiac transplantation, or depressed left ventricular function. Twenty-seven (4%) were excluded because of inadequate information. This left 661 low-risk patients with atypical chest pain. Forty-eight percent of the patients were male, with a mean age of 58.

Study design and validity This was a retrospective cohort study with an average of 23 months of follow-up. During concurrent ECG and echocardiographic testing, either exercise or pharmacologic measures were used to increase heart rate. Cardiologists interpreted the echocardiographic and ECG results independently. They obtained follow-up data through chart review and telephone interviews, and were blinded to the results of stress testing. Statistical analysis included univariate analysis (*t* tests and chi-square ratios) and multivariate analysis (stepwise regression). It is possible that medical intervention after a positive test result may have altered the subsequent incidence of cardiac events, reducing the calculated sensitivities and positive predictive values. The researchers, who all appear to be cardiologists, also present a rudimentary cost analysis. No funding source is acknowledged.

Outcomes measured The primary outcomes were major adverse cardiac events (hospitalization for unstable angina, heart failure, acute myocardial infarction, or cardiac death) and total adverse cardiac events (major cardiac events plus angioplasty or bypass surgery).

Results Forty-one (6%) of the 661 patients had an adverse cardiac event, including 16 (2%) who experienced a major event. Stress echocardiography was positive in 103 patients, and stress ECG was positive in 129 patients. The two tests agreed in 84% of patients, achieving about half of the possible agreement beyond chance ($\kappa = 0.45$). Stress echocardiography was superior to stress ECG in identifying risk for both major and total cardiac events over the 2-year follow-up period. For total cardiac adverse events, stress echocardiography had 66% sensitivity and 88% specificity, resulting in a 97% negative predictive value (NPV) and a 26% positive predictive value (PPV). For the same outcome, stress ECG only had 41% sensitivity, 81% specificity, 95% NPV, and 13% PPV. When only major events were examined, stress echocardiography remained more accurate than stress ECG. In their cost analysis, the authors favored the more expensive stress echocardiography because the greater number of false-positive and nondiagnostic stress ECGs led to additional, unnecessary cardiac catheterizations.

Recommendations for clinical practice **Stress echocardiography offers a more accurate evaluation of cardiac disease risk than stress ECG. Although its sensitivity is not particularly impressive, its high NPV may provide reassurance to the patient and physician. While this cost analysis favors echocardiography, results will vary at different medical centers. Medicare allowable payment this year is approximately $260 for stress echocardiography and $130 for stress ECG, but billing at our institution is about $1000 for stress echocardiography and $400 for stress ECG. The authors did not test radionuclide scanning, but this may also be a viable option. Given our current selection of noninvasive tests for patients with atypical chest pain, stress echocardiography appears to be a reasonable choice.**

Erik J. Lindbloom, MD
James J. Stevermer, MD
University of Missouri – Columbia
Columbia, MO 65212
E-mail: elindb@fcm.missouri.edu