Published in final edited form as:
Aliment Pharmacol Ther. 2009 April 15; 29(8): 871–881. doi:10.1111/j.1365-2036.2009.03935.x.

Adherence to best practice guidelines in dyspepsia: a survey comparing dyspepsia experts, community gastroenterologists and primary-care providers

B. M. R. Spiegel[*,†,‡,§,¶], **M. Farid**[*,†,§], **M. G. H. Van Oijen**[¶,**], **L. Laine**[††], **C. W. Howden**[‡‡], and **E. Esrailian**[†,§,¶]

[*]Department of Gastroenterology, VA Greater Los Angeles Healthcare System, Los Angels, CA, USA [†]Division of Digestive Diseases, David Geffen School of Medicine at UCLA, Los Angels, CA, USA [‡]Department of Health Services, UCLA School of Public Health, Los Angels, CA, USA [§]CURE Digestive Diseases Research Center, Los Angels, CA, USA [¶]UCLA/VA Center for Outcomes Research and Education, Los Angels, CA, USA [**]Department of Gastroenterology and Hepatology, Radboud University Nijmegen Medical Center, Nijmegen, the Netherlands [††]Department of Gastroenterology, Keck School of Medicine, University of Southern California, Los Angels, CA, USA [‡‡]Division of Gastroenterology, Northwestern University Feinberg School of Medicine, Chicago, IL, USA

Summary

Background—Although 'best practice' guidelines for dyspepsia management have been disseminated, it remains unclear whether providers adhere to these guidelines.

Aim—To compare adherence to 'best practice' guidelines among dyspepsia experts, community gastroenterologists and primary-care providers (PCPs).

Methods—We administered a vignette survey to elicit knowledge and beliefs about dyspepsia including a set of 16 best practices, to three groups: (i) dyspepsia experts; (ii) community gastroenterologists and (iii) PCPs.

Results—The expert, community gastroenterologist and PCP groups endorsed 75%, 73% and 57% of best practices respectively. Gastroenterologists were more likely to adhere with guidelines than PCPs ($P < 0.0001$). PCPs were more likely to define dyspepsia incorrectly, overuse radiographic testing, delay endoscopy, treat empirically for *Helciobacter pylori* without confirmatory testing and avoid first-line proton pump inhibitors (PPIs). PCPs had more concerns about adverse events with PPIs [e.g. osteoporosis ($P = 0.04$), community-acquired pneumonia ($P = 0.01$)] and higher level of concern predicted lower guideline adherence ($P = 0.04$).

Conclusions—Gastroenterologists are more likely than PCPs to comply with best practices in dyspepsia, although compliance remains incomplete in both groups. PCPs harbour more concerns regarding long-term PPI use and these concerns may affect therapeutic decision making. This suggests that best practices have not been uniformly adopted and persistent guideline-practice disconnects should be addressed.

Correspondence to: Dr B. M. R. Spiegel, 11301 Wilshire Blvd, Bldg 115, Room 215, Los Angeles, CA 90073, USA. bspiegel@mednet.ulca.edu.

DISCLAIMER

The opinions and assertions contained herein are the sole views of the authors and are not to be construed as official or as reflecting the views of the Department of Veteran Affairs.

Introduction

One-third of adults experience pain or discomfort in the upper abdomen during a given year.[1, 2] Of these, one-quarter seek treatment, making dyspepsia the presenting complaint of 4% of primary-care visits and 20% of outpatient gastroenterology consultations.[1, 2] The large burden of illness of dyspepsia, including its high population prevalence and impact on quality of life, leads to over $14 billion annually in direct costs of care.[3] In light of this high health economic burden, it is important that providers follow 'best practice' evidence-based management guidelines to improve patient outcomes while minimizing resource utilization.

Yet, the optimal approach to dyspepsia remains controversial. Early dyspepsia guidelines recommended antisecretories as the fist line of therapy.[4] However, as evidence mounted to suggest that *Helicobacter pylori* eradication may relieve many patients of their symptoms, subsequent consensus guidelines suggested an *H. pylori* 'test-and-treat' approach for patients with uncomplicated dyspepsia.[5–7] Specifically, the guidelines recommended that patients with dyspepsia who are aged <45 years and without alarm symptoms (bleeding, weight loss, dysphagia, anorexia, vomiting) should be tested for *H. pylori* and, if positive, receive a 10- to 14-day course of eradication therapy. If symptoms fail to improve with treatment, then diagnostic upper endoscopy is indicated.

An alternative approach is to use empiric proton pump inhibitor (PPI) therapy in lieu of up-front test-and-treat.[1, 8] Several lines of evidence support the PPI approach for dyspepsia, including: (i) PPI therapy, either alone or in combination with *H. pylori* 'test-and-treat', may be cost-effective in the management of dyspepsia, particularly in regions with a low prevalence of *H. pylori*;[9] (ii) meta-analysis reveals that PPI therapy is marginally superior to *H. pylori* test-and-treat in the management of functional dyspepsia – the most common underlying aetiology of dyspeptic symptoms;[10] (iii) data indicate that empiric PPI therapy is superior to test-and-treat for dyspepsia from underlying peptic ulcer disease – another common aetiology of dyspeptic symptoms;[11] and (iv) PPI therapy is effective in reducing dyspeptic symptoms in the setting of NSAID therapy – an increasingly prevalent risk factor for dyspepsia.[12]

This evolution in the role of PPI therapy vs. test-and-treat led to updated management guidelines released by the American College of Gastroenterology (ACG) in 2005.[8] According to these guidelines, patients <55 years of age presenting with uncomplicated dyspepsia should be empirically treated with either a PPI or *H. pylori* test-and-treat, depending on the local prevalence of *H. pylori*. In communities where the *H. pylori* prevalence is <10%, patients should initially be treated with a PPI for 4–8 weeks. In communities where prevalence is >10%, patients should begin with test-and-treat, but should next progress to PPI therapy – not endoscopy – if up-front *H. pylori* eradication is unsuccessful in controlling symptoms. Patients failing both lines of therapy should progress to endoscopy with subsequent treatment dictated by endoscopic findings. Patients aged more than 55 years should proceed directly to endoscopy prior to an empiric trial of PPI therapy or *H. pylori* test and treat.

Although the ACG guidelines have been summarized and disseminated in a best practice consensus document,[8] it remains unclear whether providers follow these guidelines, particularly given the continual flux in thinking about the optimal management of uncomplicated dyspepsia. Demonstrating wide variations in current decision making would indicate a need to disseminate better the available information and emphasize how the 2005 guidelines supplant previous consensus documents. Furthermore, identifying specific factors that predict extremes in decision-making may allow for improved targeting of areas where provider knowledge or education may be inadequate – a possible consequence of shifting guidelines over time. Examples of modifiable factors include knowledge, attitudes and beliefs about the definition of dyspepsia, the effectiveness of *H. pylori* test-and-treat, potential risks

of PPI therapy, the aetiology of functional dyspepsia and the importance of endoscopic and non-endoscopic diagnostic testing, among other factors.

We conducted a national survey to compare adherence with dyspepsia best practices between a group of dyspepsia experts vs. primary-care providers and community gastroenterologists (GIs). We further sought to identify specific areas of wide variation and to identify knowledge, attitude and belief factors that predict low adherence with guidelines.

Methods

Overview of clinical vignette survey methodology

Vignette survey design—We developed an online questionnaire with three vignettes to evaluate specific scenarios in the diagnosis and management of dyspepsia. We developed the vignettes in concert with dyspepsia experts and survey design specialists to ensure face validity, comprehensibility and comprehensiveness. Each vignette began with a standardized patient history and physical examination and was followed by management questions pertaining to diagnostic testing, treatment and follow-up. The questions included vertical single best answers, horizontal matrix items and open-ended items. The first vignette described a 44-year-old man with 12 months of epigastric discomfort unrelated to NSAID use and without alarming signs or symptoms. The second vignette depicted a 47-year-old woman with 12 months of NSAID-related epigastric pain also without alarming features. The third vignette described a 58-year-old woman with 6 months of epigastric discomfort, nausea and bloating unrelated to NSAID use, but without alarm signs or symptoms. The full vignettes are in the Appendix S1. These vignettes were accompanied by a series of stand-alone questions pertaining to dyspepsia diagnosis (including location, duration and symptom profiles), perceptions about risks of PPI therapy, beliefs about the aetiology of functional dyspepsia and beliefs about the role of centrally acting agents in dyspepsia management. The survey was iteratively tested for clarity with a series of pilot trials in a group of 15 subjects including a range of private, academic and research GIs.

Sampling frame

We surveyed four provider groups:

i. *Sample of dyspepsia key opinion leaders (‘experts’)*. We surveyed 51 international GIs who are recognized experts in dyspepsia management. We identified these key opinion leaders based on their publication records over the past 10 years, their membership in practice guideline committees and their participation in advisory councils for the ACG and the American Gastroenterological Association (AGA). We use the term ‘expert’ in reference to this group throughout the remainder of this paper. The authors were not included in this list nor did any authors complete the survey.

ii. *Simple random sample of GIs*. We surveyed a random sample of 300 GIs from the membership directory of the AGA. In case the random selection process identified a dyspepsia expert already included in the first group of providers, we repeated the random selection process to identify a second individual to avoid duplicates between samples.

SUPPORTING INFORMATION

Supporting Information: Additional Supporting Information may be found in the online version of this article:

Appendix S1. Clinical vignettes, numbers 1–3.

Please note: Wiley-Blackwell are not responsible for the content or functionality of any supporting materials supplied by the authors. Any queries (other than missing material) should be directed to the corresponding author for the article.

iii. *Simple random sample of general internal medicine physicians (GIMs)*. We surveyed a random sample of 300 GIMs, including internists and family practitioners, from the membership directory of the American Medical Association.

iv. *Simple random sample of nurse practitioners (NPs)*. To include a control group of nonphysicians who regularly manage dyspepsia, we sought a group of NPs working in primary care. We surveyed a random sample of 300 NPs from the National Veteran Affairs provider database.

Sample size considerations

Assuming 15 subjects for each of 10 potential independent predictors in multivariable regression analysis (see 'Analyses', below), we required a minimum of 150 subjects to complete the survey to avoid overmatching of the regression models. Assuming a 40% response rate, we required 380 providers to survey in the sampling frame.

Survey distribution and follow-up procedures

Respondents initially received the survey electronically using an online questionnaire platform (Survey Monkey software, http://www.surveymonkey.com). Physicians received emails with cover letters and a link to the online survey. After 2 weeks, nonresponders received a follow-up email. Finally, 1 week after the second email correspondence, a paper version of the questionnaire was mailed to nonresponders. Using baseline data from the AMA Masterfile, we compared responders with nonresponders for age, gender, region, practice setting and years in practice.

Analyses

Measuring adherence to best practices—We designed the survey to include a subset of specific questions that address adherence *versus* non-adherence to best practice guidelines in dyspepsia management. Each answer choice to this subset of questions was coded as 'appropriate' or 'inappropriate' as determined by published practice guidelines.[8] For example, ACG guidelines state that endoscopy is warranted in patients over 55 years old with dyspepsia even in the absence of alarming features.[8] Therefore, if a respondent opted to bypass endoscopy in lieu of other management approaches in patients over 55 years of age, then the response was classified as inappropriate per guidelines. Similarly, guidelines state that it is inappropriate to test for *H. pylori* with a serological test, in contrast to an active test. Therefore, if a respondent opted to test with serology instead of a stool antigen or urea breath test, then the response was classified as inappropriate.

There were 16 guideline-based items embedded in the survey (Table 2). These items were culled from the literature, including the most recent ACG,[8] AGA[1] and Rome III[13] consensus recommendations. The full list of items is provided in Table 2. We conducted bivariate analyses to compare adherence to these best practice guidelines among the four provider groups. We compared adherence across groups using chi-squared and employed a *P*-value of <0.05 as evidence for statistical significance. We then performed multivariate regression analysis to determine if any provider or practice-type characteristics (e.g. provider age, gender, practice setting, geographical location, society memberships and years of practice) were associated with endorsement of best practice guidelines. In addition, we measured the relationship between provider knowledge, attitudes and beliefs and guideline adherence. We measured the following factors:

i. *Beliefs about defining the location of dyspepsia*. Current ACG,[8] AGA[1] and Rome III[13] guidelines state that dyspepsia is nonreflux predominant pain or discomfort in the upper abdomen. Thus, symptoms below the umbilicus or in the chest are inconsistent with a diagnosis of dyspepsia. Yet the term 'dyspepsia' may carry other

meanings in clinical practice. To explore provider beliefs about the location of dyspepsia, we included a regional map of the abdomen including 13 defined areas (Figure 1) and asked respondents to endorse areas that comported with their definition of 'dyspepsia'. Respondents who endorsed regions below the umbilicus or above the epigastrium as being consistent with dyspepsia were categorized as inappropriate. We hypothesized that respondents failing to endorse the guideline-supported location of dyspepsia would be less likely to adhere with best practice guidelines.

ii. *Beliefs about the aetiology of functional dyspepsia*. Functional dyspepsia is the most common underlying explanation for dyspepsia.[1, 8, 13] Yet the aetiology of functional dyspepsia itself remains uncertain. Competing hypotheses include non-ulcerogenic *H. pylori* infection, acid-induced symptoms, dysmotility and visceral hypersensivity, among other explanations.[1, 8, 13] We posed a series of questions (Table 3) to elicit respondent beliefs about functional dyspepsia. We hypothesized that beliefs about the aetiology of functional dyspepsia would influence diagnostic and therapeutic decision-making.

iii. *Perceived risk of PPI therapy*. Accumulating data indicate that chronic PPI therapy may be associated with a range of adverse events, including community-acquired pneumonia,[14, 15] osteoporosis,[16] vitamin B12 deficiency, *Clostridium difficile* colitis[17] and interstitial nephritis,[18] among others. Previous associations, now largely discounted, include carcinoid tumours, colon polyps and gastric cancer. The survey included items about level of concern for seven purported PPI adverse events (Table 4). Responses were graded on a five-point scale from 'not at all concerned' to 'extremely concerned', and were dichotomized as positive (at least 'moderately concerned') or negative. Each respondent received a 'PPI concern index', calculated by summing the total adverse events positively endorsed (range = 0–7). We hypothesized that higher levels of concern would predict lower adherence with guidelines.

Results

Sample characteristics

Table 1 displays the characteristics of the survey respondents. Two hundred ninety respondents returned their surveys, including 30 of 51 dyspepsia experts (59% response rate), 90 of 300 community GIs (30% response rate), 96 of 300 GIMs (32% response) and 74 of 300 NPs (25% response). There were no significant differences between responders and nonresponders for age, gender, years in practice, practice setting or region of practice. The expert group was significantly more likely to be engaged in conducting research. However, compared with the non-expert groups, experts had a smaller proportion of time dedicated to clinical care and saw fewer dyspepsia patients in clinical practice.

Adherence to dyspepsia best practices

Table 2 provides the results of expert and non-expert adherence to best practices regarding definitions, diagnosis and management of dyspepsia. The expert, GI, GIM and NP groups endorsed 75%, 73%, 59% and 55% of 'best practices' respectively. The difference in guideline adherence between expert and GI groups was nonsignificant. Similarly, the difference between GIM and NP groups was nonsignificant. However, when comparing GIs (i.e. experts + GI) vs. primary-care providers (i.e. GIMs + NPs), the difference in adherence was highly significant (74% vs. 57%; $\Delta = 17\%$; 95% CI = 12–22%; $P < 0.0001$). Compared with GIs, primary-care providers were more likely to define dyspepsia incorrectly, to perform nonguideline supported diagnostic testing (e.g. abdominal ultrasound, radiography, computerized tomography), to test for *H. pylori* with serology, delay endoscopy in patients >55 years old, to treat empirically for

H. pylori without first testing for presence of *H. pylori* and to avoid first-line PPIs in lieu of other medical therapies. The guideline with the lowest overall adherence was the requirement to document a negative upper endoscopy prior to diagnosing 'functional dyspepsia'. Although dyspepsia experts were more likely than other groups to endorse this guideline, endorsement of this guideline was low among all groups (experts = 28%; GI = 12%; GIM = 10%; NP = 10%; $P = 0.02$). In multivariable regression adjusting for provider demographics, practice setting, years in practice, patient load and provider group, the expert and GI groups predicted higher guideline adherence ($P < 0.01$ for each group), while the GIM group ($P < 0.01$) and NP group ($P = 0.02$) predicted lower adherence.

Predictors of low guideline adherence

In addition to measuring unadjusted and adjusted differences in guideline adherence among groups, we measured the impact of various knowledge, attitude and belief factors on guideline endorsement across groups. We specifically measured the impact of three areas on guideline adherence: (i) knowledge of dyspepsia location, (ii) beliefs about the aetiology of functional dyspepsia and (iii) perceived risks of PPI therapy.

Figure 1 depicts a regional map of the abdomen with respondent data regarding the perceived location of 'dyspepsia'. Ninety-six per cent of respondents believed dyspepsia includes the epigastrium, and 100% believed that it includes at least one region above the umbilicus and below the chest. Fifty-nine per cent believed dyspepsia includes the lower chest and 17% endorsed one or more infra-umbilical regions as consistent with dyspepsia. The expert and community GI groups were less likely to endorse an infra-umbilical region (expert = 3%; GI = 12%) compared with the GIM (20%) and NP (15%) groups (P = 0.05). After adjusting for group, demographics, practice setting, experience and patient load, respondents endorsing an infra-umbilical location for dyspepsia adhered to 1.5 fewer best practices ($P < 0.01$).

Table 3 provides data regarding respondent beliefs about the aetiology of functional dyspepsia. Compared with other groups, experts were less likely to believe that functional dyspepsia 'is a form of IBS', is 'caused by anxiety or depression' or is 'caused by problems with gastric motility'. None of these beliefs predicted adherence to guidelines.

Table 4 provides the proportion of respondents from each group at least 'moderately concerned' about each of seven potential adverse effects of long-term PPI therapy. The primary-care groups were more concerned than gastroenterology groups for all adverse effects except *C. difficile* colitis. The highest concerns were registered for osteoporosis, community-acquired pneumonia and vitamin B12 deficiency. For example, 36% of internists and 24% of community GIs were at least 'moderately concerned' about osteoporosis from chronic PPI use.

In regression analysis adjusting for key covariates, higher level of concern about PPI adverse effects predicted lower adherence to guidelines ($P = 0.039$).

Discussion

It is important to identify areas of disconnect between guidelines and practice and to understand predictors of low guideline compliance. These data may better equip investigators and policy makers to implement future quality improvement measures aimed at reducing extreme variations in resource utilization, streamlining decision-making towards best practice guidelines, increasing appropriateness of care and ultimately improving the quality and cost-effectiveness of care.

We found that GIs, including dyspepsia experts and community GIs are more likely than primary-care providers to endorse current best practice guidelines in dyspepsia, although

adherence was incomplete in all groups (experts = 75%; GIs = 73%; GIMs = 59%; NPs = 55%). Primary-care providers diverge from GIs in their definitions of dyspepsia, approach to *H. pylori* testing and treatment, use of radiographic studies, timing of endoscopy, use of PPIs and beliefs about the aetiology of functional dyspepsia. Each area of disconnect is discussed below. These differences may arise from several factors, including additional training of GIs in dyspepsia management and differences in the populations evaluated between generalists and specialists. In particular, it is likely that GIs see more severe and difficult-to-treat patients and, on this basis alone, may have more knowledge about the management of dyspepsia.

We found that 'dyspepsia' means different things to different providers, and that beliefs about the definition of dyspepsia correlate with management decisions. Although the ACG,[8] AGA[1] and Rome III[13] guidelines define dyspepsia as recurrent upper abdominal pain or discomfort that is nonreflux predominant, we found that nearly one in five primary-care providers include infra-umbilical regions in their definition of 'dyspepsia'. Similarly, primary-care providers were more likely to include 'heartburn' within the dyspepsia spectrum and to believe that dyspepsia includes symptoms in the lower chest – not just the epigastrium. Moreover, after adjusting for provider group, demographics, practice setting and experience, those endorsing an infra-umbilical location adhered to fewer best practice guidelines. This finding might simply reflect that misdefining dyspepsia is a marker of inadequate knowledge about dyspepsia management in general, and that inadequate knowledge leads to poor guideline adherence. An alternative hypothesis is that some providers confuse dyspepsia with irritable bowel syndrome – a functional syndrome marked by abdominal pain or discomfort and alterations in bowel habit – and thus mistakenly apply treatment principles of one condition to the other. In any event, the definition of 'dyspepsia' appears to be a moving target. Without a shared diagnostic language, providers may be unlikely to streamline care around common dyspepsia guidelines.

We found that many primary-care providers fail to comply with best practice guidelines regarding *H. pylori* testing and treatment. Previous surveys have revealed similar findings.[19, 20] Our data extend these findings and highlight that many primary-care providers are still poorly versed in *H. pylori* management principles despite opportunities to improve on these documented areas of guideline disconnect. For example, we found that nearly half of the GIM and NP groups endorsed testing for *H. pylori* with serology in lieu of an active test (e.g. stool antigen, urea breath test). This suggests that primary-care providers are unaware that serological tests have a poor positive predictive value,[21] particularly in regions with low *H. pylori* prevalence. We also found that nearly half of GIM physicians in our survey did not endorse up-front *H. pylori* test-and-treat when faced with a young patient in a high prevalence region. These providers instead selected a range of other therapies, including histamine-2 receptor antagonists, PPIs or centrally acting agents. Finally, we found that 14% of GIMs and 27% of NPs still endorse treatment of *H. pylori* without first testing for the presence of *H. pylori*. Although this is an improvement on the 33% rate of empiric therapy previously documented by Howden and colleagues in a secondary analysis of US managed care claims data,[22] the persistent noncompliance suggests that too many patients are receiving potentially unwarranted antibiotic therapy. Future programmes aimed at improving dyspepsia guideline compliance must focus on persistent knowledge and practice deficits pertaining to *H. pylori* management principles.

The role of non-endoscopic imaging studies is generally limited in dyspepsia, particularly in the absence of alarming signs or symptoms. Yet, despite creating vignettes that lacked alarm symptoms and featured explicitly nonbiliary dyspeptic symptoms, we found that nearly 25% of both primary-care providers and community GIs endorsed using abdominal ultrasonography. In addition, 10–15% of primary-care providers endorsed either abdominal radiography or computerized tomography. In the absence of alarming features or biliary-type

symptoms, these tests are considered low-yield and cost-ineffective. Future quality improvement programmes should address inappropriate overuse of imaging studies in uncomplicated dyspepsia.

Whereas dyspepsia guidelines do not support routine abdominal imaging, guidelines do recommend performing initial upper endoscopy in patients over 55 years of age with a recent onset of dyspepsic symptoms.[8] However, we found that less than half of primary-care providers endorse this guideline (GIMs = 27%; NPs = 36%) and many GIs disagreed with this approach as well. The reluctance to perform early endoscopy in older dyspeptics may stem from several facts including: (i) gastric cancer remains rare in the US; (ii) most dyspeptics with underlying gastric cancer already have incurable stage IV disease and have developed alarming features[23] and (iii) empirical trials with PPIs or *H. pylori* test-and-treat are short and unlikely to improve appreciably the symptoms of gastric cancer – thus unlikely to alter significantly overall outcomes vs. bypassing therapeutic trials in lieu of initial endoscopy. Yet, gastric cancer is potentially curable if detected early and empirical medical trials could potentially delay diagnosis. In the absence of cost-effectiveness analyses or US randomized outcome trials of early vs. delayed endoscopy in older dyspeptic patients without alarm features, it remains uncertain whether routine endoscopy is either effective or cost-effective in older patients with uncomplicated dyspepsia.

Recent reports suggesting that long-term use of PPIs may increase the risk of adverse events, such as osteoporosis[16] and community-acquired pneumonia,[14, 15] have been widely publicized in the medical and lay press. Yet, data indicate that PPI-related adverse events are infrequent and the 'number needed to harm' is high.[14–17] That is, the absolute risk of a PPI-related adverse event remains extremely small suggesting that PPI therapy should be used in patients who otherwise qualify for PPI therapy on the basis of evidence-based guidelines. We found that primary-care providers have higher levels of concern about PPI adverse events than GIs, although even community GIs and many experts harbour concern for some adverse events (Table 4). For example, nearly one-quarter of community GIs were at least 'moderately concerned' about osteoporosis from long-term use of PPIs. Moreover, providers with higher concern were less likely to follow guidelines in dyspepsia, including guidelines regarding the use of PPIs in particular. This suggests that concern about PPI-related adverse effects may negatively influence practice patterns in the management of foregut syndromes like dyspepsia. Future research should also measure the impact of PPI-related concerns on adherence to GERD (gastro-oesophageal reflux disease) guidelines and should explore the impact of evidence-based educational interventions on provider beliefs about PPI adverse effects.

A potential limitation of this study is that survey responses may not be reflective of actual decision-making in clinical practice. Directly observing patient–provider interactions is considered the gold standard for assessing process of care. However, this approach is also limited because of the Hawthorne effect in which providers artificially alter their practice when they are knowingly observed. This undermines the efforts to capture the true process of care. Standardized patients[24] and medical record data abstraction[25] are alternatives. Notably, survey-based clinical vignettes have been validated as an accurate surrogate for both chart abstraction and standardized patients[26] and are thus widely recognized to be a valid, reliable, practical and cost-effective technique to assess process of care. An additional limitation is that our vignettes do not represent all possible scenarios in dyspepsia. Other investigators may well have developed different vignettes with different details. However, we followed several steps to ensure adequate content validity of our vignettes, including consultation with key opinion leaders in dyspepsia, review by experts in survey design and administration and pilot testing for comprehensibility. Moreover, regardless of the precise content of our vignettes, all providers were faced with the same clinical facts and data, yet came to different conclusions on many occasions. This suggests that alternative vignettes would probably yield similar

variations in the process of care. Third, our distinction of expert vs. non-expert, although based on explicit criteria, may fail to acknowledge the fact that many community providers who manage dyspepsia on a daily basis might have more clinical experience than academic thought leaders. Nevertheless, even after adjusting for clinical loads, we found that experts remained more likely to follow guidelines than nonexperts. Fourth, because it is very difficult to find accurate addresses or emails of NPs, we relied on a convenience sample of NPs from the VA system as this group is well characterized and reachable. Nonetheless, it is certainly possible that this NP group is systematically different from NPs from other healthcare systems. Of note, the VA system is highly effective in following evidence-based guidelines throughout primary care and achieves quality indicators at a rate higher than virtually every other healthcare system in the world.[27] So it is possible that NPs in the VA would be even more likely – not less likely – to follow dyspepsia guidelines than NPs in other systems. Nonetheless, we cannot determine whether NPs from other healthcare systems would have responded differently to our survey. In any event, the purpose of the NP group was primarily as an internal nonphysician control group rather than a group for primary analysis.

Overall, we found that best practice guideline have not been uniformly adopted, particularly among primary-care providers; persistent guideline-practice disconnects should be addressed. Primary-care providers are more likely than GIs to misdefine dyspepsia, inappropriately use serology to check for *H. pylori*, treat *H. pylori* without preceding diagnostic confirmation, avoid a PPI trial, fail to endorse endoscopy for patients >55 years old and inappropriately overuse radiographic studies in dyspepsia. In addition, primary-care providers harbour more concerns than GIs regarding long-term PPI use and these concerns may affect therapeutic decision-making in dyspepsia. In light of these practice-guideline disconnects, coupled with likely background confusion arising from multiple paradigm shifts from successive published guidelines, investigators should develop and implement multifactorial health system interventions to improve adherence to current dyspepsia guidelines by focusing on the specific areas identified in this survey.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

Declaration of personal and funding interests: Dr Spiegel is supported by a Veteran's Affairs Health Services Research and Development (HSR&D) Career Development Transition Award (RCD 03-179-2). Dr Spiegel has served as a consultant to TAP Pharmaceutical Products Inc, Takeda Pharmaceuticals of North America, Novartis, and AstraZeneca. He has received research funding from AstraZeneca, Novartis, Amgen, Procter & Gamble, TAP, Takeda, and AstraZeneca. Drs Esrailian and Spiegel are supported by the CURE Digestive Disease Research Center (NIH 2P30 DK 041301-17). Dr Howden has served as a consultant to TAP Pharmaceutical Products Inc., Takeda Pharmaceuticals of North America, Santarus, Otsuka, Novartis, Biovail, Extera Partners and KV Pharmaceuticals, as a speaker for AstraZeneca, Santarus and Otsuka, and has received research funding from AstraZeneca. Dr Laine has acted as a consultant for AstraZeneca, Eisai, Santarus, Horizon and Pozen, and has received research support from Takeda Pharmaceuticals and GSK. M. G. H. van Oijen is a consultant and has received grant support from AstraZeneca and Nycomed. The authors had complete authority over all aspects of the study, including development of the hypotheses and analysis plan, development of data collection instruments, collection of data, analysis and interpretation of data, and writing of the manuscript.

References

1. Talley NJ, Vakil NB, Moayyedi P. American Gastroenterological Association technical review on the evaluation of dyspepsia. Gastroenterology 2005;129:1756–80. [PubMed: 16285971]
2. Majumdar SR, Soumerai SB, Farraye FA, et al. Chronic acid-related disorders are common and underinvestigated. Am J Gastroenterol 2003;98:2409–14. [PubMed: 14638341]

3. Everhart JE, Ruhl CE. Burden of digestive diseases in the United States Part 1: overall and upper gastrointestinal diseases. Gastroenterology 2009;136:376–86. [PubMed: 19124023]
4. American College of Physicians. Endoscopy in the evaluation of dyspepsia. Ann Intern Med 1985;102:266–9. [PubMed: 3917639]
5. American Gastroenterological Association. AGA technical review: evaluation of dyspepsia. Gastroenterology 1998;114:582–95. [PubMed: 9496950]
6. American Gastroenterological Association. American Gastroenterological Association medical position statement: evaluation of dyspepsia. Gastroenterology 1998;114:579–81. [PubMed: 9496949]
7. Peterson WL, Fendrick M, Cave DR, Peura DA, Garabedian-Ruffalo SM, Laine L. *Helicobacter pylori*-related disease: guidelines for testing and treatment. Arch Intern Med 2000;160:1285–91. [PubMed: 10809031]
8. Talley NJ, Vakil N, Practice Parameters Committee of the American College of Gastroenterology. Guidelines for the management of dyspepsia. Am J Gastroenterol 2005;100:2324–37. [PubMed: 16181387]
9. Spiegel BMR, Vakil NB, Ofman JJ. Dyspepsia management in primary care: a decision analysis of competing strategies. Gastroenterology 2002;122:1270–85. [PubMed: 11984514]
10. Moayyedi P, Delaney BC, Vakil N, Forman D, Talley NJ. The efficacy of proton pump inhibitors in nonulcer dyspepsia: a systematic review and economic analysis. Gastroenterology 2004;127:1329–37. [PubMed: 15521002]
11. Spiegel BM, Tan J, Lim B, Farid M, Singh I, van Oijen MG. Incident dyspepsia in the treatment of peptic ulcer disease: a meta-analysis comparing *H. Pylori* eradication versus proton pump inhibitor therapy. Gastroenterology 2005;130:1072.
12. Spiegel BMR, Farid M, Gralnek IM, Dulai GS, Kanwal F. Comparing rates of dyspepsia with coxib versus NSAID+PPI combination therapy: a systematic review and meta-analysis. Am J Med 2006;119:448.e27–36. [PubMed: 16651060]
13. Tack J, Talley NJ, Camilleri M, et al. Functional gastroduodenal disorders. Gastroenterology 2006;130:1466–79. [PubMed: 16678560]
14. Laheij RJ, Sturkenboom MC, Hassing RJ, Dieleman J, Stricker BH, Jansen JB. Risk of community-acquired pneumonia and use of gastric acid-suppressive drugs. JAMA 2004;292:1955–60. [PubMed: 15507580]
15. Laheij RJ, VanIjzendoorn MC, Janssen MJ, Jansen JB. Gastric acid-suppressive therapy and community-acquired respiratory infections. Aliment Pharmacol Ther 2003;18:847–51. [PubMed: 14535879]
16. Yang YX, Lewis JD, Epstein S, Metz DC. Long-term proton pump inhibitor therapy and risk of hip fracture. JAMA 2006;296:2947–53. [PubMed: 17190895]
17. Dial S, Delaney JA, Barkun AN, Suissa S. Use of gastric acid-suppressive agents and the risk of community-acquired *Clostridium difficile*-associated disease. JAMA 2005;294:2989–95. [PubMed: 16414946]
18. Geevasinga N, Coleman PL, Webster AC, Roger SD. Proton pump inhibitors and acute interstitial nephritis. Clin Gastroenterol Hepatol 2006;4:597–604. [PubMed: 16630752]
19. Sharma VK, Howden CW. A national survey of primary care physicians' perceptions and practices related to *Helicobacter pylori* infection. J Clin Gastroenterol 2004;38:326–31. [PubMed: 15087691]
20. Chey WD, Inadomi JM, Booher AM, Sharma VK, Fendrick AM, Howden CW. Primary-care physicians' perceptions and practices on the management of GERD: results of a national survey. Am J Gastroenterol 2005;100:1237–42. [PubMed: 15929751]
21. Vakhil N, Fendrick AM. How to test for *Helicobacter pylori* in 2005. Cleve Clin J Med 2005;72 (Suppl. 2):S8–13. [PubMed: 15931850]
22. Howden CW, Blume SW, de Lissovoy G. Practice patterns for managing *Helicobacter pylori* infection and upper gastrointestinal symptoms. Am J Manag Care 2007;13:37–44. [PubMed: 17227202]
23. Canga C, Vakil N. Upper GI malignancy, uncomplicated dyspepsia, and the age threshold for early endoscopy. Am J Gastroenterol 2002;97:600–3. [PubMed: 11922553]
24. Colliver JA, Swartz MH. Assessing clinical performance with standardized patients. JAMA 1997;278:790–1. [PubMed: 9286845]

25. Luck J, Peabody JW, Dresselhaus TR, et al. How well does chart abstraction measure quality? A prospective comparison of standardized patients with the medical record. Am J Med 2000;108:642–9. [PubMed: 10856412]

26. Peabody JW, Luck J, Glassman P, Hansen J, Spell M, Lee M. Measuring the quality of physician practice by using clinical vignettes: a prospective validation study. Ann Intern Med 2004;141:771–80. [PubMed: 15545677]

27. Asch SM, McGlynn EA, Hogan MM, et al. Comparison of quality of care for patients in the Veterans Health Administration and patients in a national sample. Ann Intern Med 2004;141:938–45. [PubMed: 15611491]

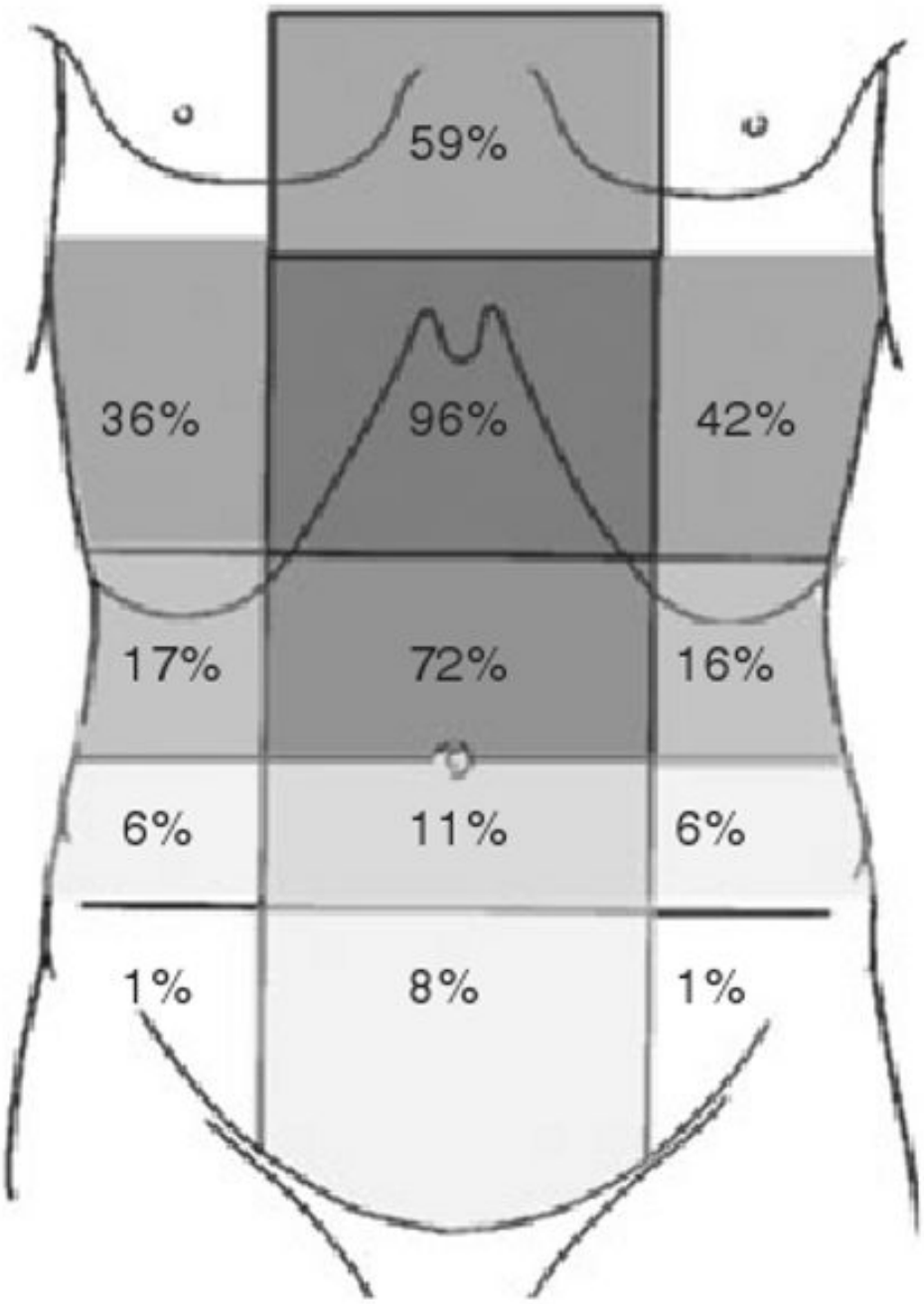

Figure 1.
Abdominal Regions Marked & Shaded by Proportion Endorsing as part of "Dyspepsia" Definition. The survey included a regional map of the abdomen, and asked respondents to endorse areas that comport with their definition of "dyspepsia".

Aliment Pharmacol Ther. Author manuscript; available in PMC 2010 October 12.

Table 1

Demographic and practice-pattern information of respondents

Variable	Dyspepsia experts (*n* = 28)	Community GIs (*n* = 78)	Primary-care providers (*n* = 89)	Nurse practitioners (*n* = 61)	*P*-value
Age (mean years ± s.d.)	51.7 ± 10	52.1 ± 8	53.6 ± 8	45.4 ± 9	0.85
Male gender (%)	92	88	68	7	<0.001
Years in practice	26 ± 10	26 ± 9	21 ± 10	18 ± 13	0.002
Per cent of time dedicated to clinical practice	42	77	84	90	<0.001
Per cent of time dedicated to research	39	12	6	1	<0.001
Per cent of respondents who evaluate/treat >20 dyspepsia patients per month	18	36	15	20	0.007
Geographical location (%)					
West	21	21	22	21	0.91
Midwest	8	17	18	20	0.07
South	37	36	37	29	0.09
Northeast	23	22	23	30	0.73
International	11	4	0	0	0.02

GI, gastroenterologist.

Table 2

Comparison of adherence to dyspepsia guidelines/best practices among dyspepsia experts, community gastroenterologists, general internal medicine physicians and nurse practitioners

Guideline/best practice	Experts	GIs	GIMs	NPs	χ^2 *P*-value
Guidelines regarding definition of 'dyspepsia'					
Dyspepsia does not include symptoms below the umbilicus (% agree)	86	89	80	86	0.056
Dyspepsia does not include symptoms in the chest	86	89	80	86	0.056
'Heartburn' is not a defining symptom of dyspepsia	76	73	26	28	<0.001
'Dysphagia' is not a defining symptom of dyspepsia	90	97	82	66	<0.001
Symptoms must be present for at least 6 months to make the diagnosis of functional dyspepsia	38	42	40	52	0.59
Guidelines regarding diagnostic testing in dyspepsia					
The diagnosis of 'functional dyspepsia' requires documentation of a negative endoscopy – i.e. 'functional dyspepsia' cannot be diagnosed in the absence of a negative endoscopy (% agree)	28	12	10	10	0.02
'Functional dyspepsia' is a diagnosis of exclusion	41	69	33	38	0.49
Patients >55 years old with dyspepsia should undergo endoscopy	83	69	27	36	<0.01
Should test for *Helicobacter pylori* with an active test (stool antigen or urea breath test) – not with serology	83	73	56	53	<0.01
Abdominal ultrasound is not indicated in nonbiliary dyspepsia without alarming features (% agree not indicated)	86	74	79	68	0.03
Abdominal radiography (e.g. 'kidney, ureter, bladder' radiograph) is not indicated in dyspepsia without alarming features (% agree not indicated)	100	95	89	84	0.005
Computerized tomography of the abdomen is not indicated in dyspepsia without alarming features (% agree not indicated)	97	96	90	91	0.42
Guidelines regarding treatment in dyspepsia					
Helicobacter pylori 'test-and-treat' is first line therapy in young patients (<55) without alarm signs or symptoms in regions with an *H. pylori* prevalence >10%	69	69	54	84	0.004
PPI trial is next therapy in young patient failing *H. pylori* test-and-treat	52	62	39	33	<0.01
It is inappropriate to administer antibiotics for *H. pylori* without first testing for the presence of *H. pylori*	100	95	86	73	0.02
PPI is preferable to histamine-2 receptor antagonist for treating NSAID-induced dyspepsia	90	94	69	67	<0.01

Data represent the percentage of respondents from each group who agreed with each guideline/best practice.

GI, gastroenterologist; GIM, general internal medicine; NP, nurse practitioner, PPI, proton pump inhibitor.

Table 3

Comparison of beliefs about functional dyspepsia among dyspepsia experts, community gastroenterologists, general internal medicine physicians and nurse practitioners

Beliefs about functional dyspepsia	Experts	GIs	GIMs	NPs	χ^2 *P*-value
Functional dyspepsia is a form of irritable bowel syndrome	21*	50	35	30	0.002
Functional dyspepsia is not a true diagnosis	10	10	12	25	0.12
Functional dyspepsia is often caused by concurrent anxiety or depression	10*	29	38	39	0.06
Functional dyspepsia is often caused by problems with gastric motility	14*	29	34	46	0.06

Data represent the percentage of respondents from each group who either ‘agree strongly’ or ‘agree completely’ with each stated belief about functional dyspepsia.

guideline/best practice.

GI, gastroenterologist; GIM, general internal medicine; NP, nurse practitioner.

* Difference between experts vs. all other groups was significant ($P < 0.05$).

Aliment Pharmacol Ther. Author manuscript; available in PMC 2010 October 12.

Table 4

Comparison of beliefs about potential adverse effects of long-term proton pump inhibitor use among dyspepsia experts, community gastroenterologists, general internal medicine physicians and nurse practitioners

Potential adverse effect of long-term PPI use	Experts	GIs	GIMs	NPs	χ^2 *P*-value
Colon polyps	3	1	7	16	0.009
Osteoporosis	7	24	36	36	0.036
Clostridium difficile colitis	14	13	16	23	0.36
Carcinoid	3	4	10	30	<0.0001
Community acquired pneumonia	10	4	19	25	0.01
Gastric cancer	7	4	16	33	<0.0001
Vitamin B12 deficiency	10	14	28	43	0.0004

Data represent the percentage of respondents from each group who were at least ‘moderately concerned’ about each potential PPI adverse effects.

GI, gastroenterologist; GIM, general internal medicine; NP, nurse practitioner; PPI, proton pump inhibitor.

Aliment Pharmacol Ther. Author manuscript; available in PMC 2010 October 12.