

**ADHERENCE TO BEST PRACTICE GUIDELINES IN DYSPEPSIA:
A SURVEY COMPARING DYSPEPSIA EXPERTS, COMMUNITY
GASTROENTEROLOGISTS, AND PRIMARY CARE PROVIDERS**

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ABSTRACT

Background: Although “best practice” guidelines for dyspepsia management have been disseminated, it remains unclear whether providers adhere to these guidelines. We conducted a survey to compare adherence 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 3 groups: (1) dyspepsia experts; (2) community gastroenterologists, and (3) 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 incorrectly define dyspepsia, overuse radiographic testing, delay endoscopy, treat empirically for *H. pylori* without confirmatory testing, and avoid first-line 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 harbor 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.

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 in order to improve patient outcomes while minimizing resource utilization.

Yet the optimal approach to dyspepsia remains controversial. Early dyspepsia guidelines recommended antisecretories as the first line of therapy.⁴ However, as evidence mounted to suggest that *Helicobacter pylori* (*H. 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.^{5,6,7} Specifically, the guidelines recommended that patients with dyspepsia under 45 years old and without alarm symptoms (bleeding, weight loss, dysphagia, anorexia, vomiting) should be tested for *H. pylori* and, if positive, receive a 10-14 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.^{8,9} Several lines of evidence support the PPI approach for dyspepsia, including: (1) 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*;¹⁰ (2) 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 etiology of

dyspeptic symptoms;¹¹ (3) data indicate that empiric PPI therapy is superior to test-and-treat for dyspepsia from underlying peptic ulcer disease – another common etiology of dyspeptic symptoms;¹² and (4) PPI therapy is effective in reducing dyspeptic symptoms in the setting of NSAID therapy – an increasingly prevalent risk factor for dyspepsia.¹³

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 2005.⁹ According to these guidelines, patients under 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. Patients failing both lines of therapy should progress to endoscopy with subsequent treatment dictated by endoscopic findings. Patients over the age of 55 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,⁹ 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 better disseminate 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 etiology 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. 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 3 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**. 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 etiology 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 gastroenterologists.

Sampling Frame

We surveyed 4 provider groups:

(1) Sample of Dyspepsia Key Opinion Leaders (“Experts”)

We surveyed 51 international gastroenterologists who are recognized experts in dyspepsia management. We identified these key opinion leaders based on their publication records over the past ten 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.

(2) Simple Random Sample of Community Gastroenterologists (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.

(3) 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.

(4) Simple Random Sample of Nurse Practitioners (NPs)

In order to include a control group of non-physicians 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 “Analytic Statistics,” below), we required a minimum of 150 subjects to complete the survey in order 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, www.surveymonkey.com). Physicians received e-mails with cover letters and a link to the online survey. After 2 weeks, non-responders received a follow-up e-mail. Finally, one week after the second e-mail correspondence, a paper version of the questionnaire was mailed to non-responders. Using baseline data from the AMA Masterfile, we compared responders to non-responders for age, gender, region, practice setting, and years in practice.

Analyses

Measuring Adherence to Best Practices

We designed the survey to include a sub-set of specific questions that address adherence *versus* non-adherence to best practice guidelines in dyspepsia management. Each answer choice to this sub-set of questions was coded as “appropriate” or “inappropriate” as determined by published practice guidelines.⁹ For example, ACG guidelines state that endoscopy is warranted in patients over 55-years-old with dyspepsia, even in the absence of alarming features.⁹ 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,⁹ AGA,⁸ and Rome III¹⁴ 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 4 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:

- 1) Beliefs about Defining the Location of Dyspepsia: Current ACG,⁹ AGA,⁸ and Rome III¹⁴ guidelines state that dyspepsia is non-reflux 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.

- 2) Beliefs About the Etiology of Functional Dyspepsia: Functional dyspepsia is the most common underlying explanation for dyspepsia.^{8,9,14} Yet the etiology of functional dyspepsia itself remains uncertain. Competing hypotheses include non-ulcerogenic *H. pylori* infection, acid-induced symptoms, dysmotility, and visceral hypersensitivity, among other explanations.^{8,9,14} We posed a series of questions (**Table 3**) to elicit respondent beliefs about functional dyspepsia. We hypothesized that beliefs about the etiology of functional dyspepsia would influence diagnostic and therapeutic decision-making.
- 3) 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,^{15,16} osteoporosis,¹⁷ vitamin B12 deficiency, *Clostridium difficile* colitis,¹⁸ and interstitial nephritis,¹⁹ among others. Previous associations, now largely discounted, include carcinoid tumors, colon polyps, and gastric cancer. The survey included items about level of concern for 7 purported PPI adverse events (**Table 4**). Responses were graded on a 5-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 gastroenterologists (30% response rate), 96 of 300 GIMs (32% response), and 74 of 300 NPs (25% response). There were no significant differences between responders and non-responders 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 to 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 non-significant. Similarly, the difference between GIM and NP groups was non-significant. However, when comparing gastroenterologists (*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 to gastroenterologists, primary care providers were more likely to incorrectly define dyspepsia, to perform non-guideline 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 3 areas on guideline adherence: (1) knowledge of dyspepsia location, (2) beliefs about the etiology of functional dyspepsia, and (3) 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 percent 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 percent 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 to 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 etiology of functional dyspepsia. Compared to 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 with guidelines.

Table 4 provides the proportion of respondents from each group at least “moderately concerned” about each of 7 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 with 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 gastroenterologists, including dyspepsia experts and community gastroenterologists, 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 gastroenterologists 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 etiology of functional dyspepsia. Each area of disconnect is discussed below.

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,⁹ AGA,⁸ and Rome III¹⁴ guidelines define dyspepsia as recurrent upper abdominal pain or discomfort that is non-reflux predominant, we found that nearly 1 in 5 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 mis-defining 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.^{20,21} 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 serologic tests have a poor positive predictive value,²² 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 U.S. managed care claims data,²³ the persistent non-compliance suggests that too many patients are receiving potentially unwarranted antibiotic therapy. Future programs 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 non-biliary dyspeptic symptoms, we found that nearly 25% of both primary care providers and community gastroenterologists 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 programs 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 dyspeptic symptoms.⁹ However, we found that less than half of primary care providers endorse this guideline (GIMs=27%; NPs=36%), and many gastroenterologists disagreed with this approach as well. The reluctance to perform early endoscopy in older dyspeptics may stem from several facts, including: (1) gastric cancer remains rare in the U.S.; (2) most dyspeptics with underlying gastric cancer already have incurable stage IV disease and have developed alarming features;²⁴ and (3) empiric trials with PPIs or *H. pylori* test-and-treat are short, and unlikely to appreciably improve the symptoms of gastric cancer – thus unlikely to significantly alter overall outcomes *versus* bypassing therapeutic trials in lieu of initial endoscopy. Yet gastric cancer is potentially curable if detected early, and empiric medical trials could potentially delay diagnosis. In the absence of cost-effectiveness analyses or U.S. 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 osteoporosis¹⁷ and community-acquired pneumonia,^{15,16} 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.¹⁵⁻¹⁸ We found that primary care providers have higher levels of concern about PPI adverse events than gastroenterologists, although even community gastroenterologists and many experts harbor concern for some adverse events (**Table 4**). For example, nearly one-quarter of community gastroenterologists 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 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 patients²⁵ and medical record data abstraction²⁶ are alternatives. Notably, survey-based clinical vignettes have been validated as an accurate surrogate for both chart abstraction

and standardized patients,²⁷ 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 likely 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 non-experts.

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 gastroenterologists to mis-define 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 harbor more concerns than gastroenterologists 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 multi-factorial health system interventions to improve adherence with current dyspepsia guidelines by focusing on the specific areas identified in this survey.

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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 \pm SD)	51.7 \pm 10	52.1 \pm 8	53.6 \pm 8	45.4 \pm 9	0.85
Male Gender (%)	92%	88%	68%	7%	<0.001
Years in Practice	26 \pm 10	26 \pm 9	21 \pm 10	18 \pm 13	0.002
Percent of time dedicated to clinical practice	42%	77%	84%	90%	<0.001
Percent of time dedicated to research	39%	12%	6%	1%	<0.001
Percent of respondents who evaluate/treat >20 dyspepsia patients per month	18%	36%	15%	20%	0.007
Geographic 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

Table 2. Comparison of adherence to dyspepsia guidelines/best practices among dyspepsia experts, community gastroenterologists (GIs), General Internal Medicine (GIM) physicians, and Nurse Practitioners (NPs). Data represent the percentage of respondents from each group who agreed with each guideline / best practice.

Guideline / Best Practice	Experts	GIs	GIMs	NPs	χ^2 p-value
Guidelines Regarding <u>Definition</u> of “Dyspepsia”					
Dyspepsia does <u>not</u> include symptoms below the umbilicus (% agree)	86%	89%	80%	86%	0.056
Dyspepsia does <u>not</u> include symptoms in the chest	86%	89%	80%	86%	0.056
“Heartburn” is <u>not</u> a defining symptom of dyspepsia	76%	73%	26%	28%	<0.001
“Dysphagia” is <u>not</u> a defining symptom of dyspepsia	90%	97%	82%	66%	<0.001
Symptoms must be present for at least 6 months in order to make the diagnosis of functional dyspepsia	38%	42%	40%	52%	0.59
Guidelines Regarding <u>Diagnostic Testing</u> 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 <i>H. pylori</i> with an active test (stool antigen or urea breath test) – <u>not</u> with serology.	83%	73%	56%	53%	<0.01
Abdominal ultrasound is <u>not</u> indicated in non-biliary dyspepsia without alarming features (% agree not indicated)	86%	74%	79%	68%	0.03
Abdominal radiography (e.g. “kidney, ureter, bladder” radiograph) is <u>not</u> indicated in dyspepsia without alarming features (% agree not indicated)	100%	95%	89%	84%	0.005
Computerized tomography (CT) of the abdomen is <u>not</u> indicated in dyspepsia without alarming features (% agree not indicated)	97%	96%	90%	91%	0.42
Guidelines Regarding <u>Treatment</u> in Dyspepsia					
<i>H. pylori</i> “test-and-treat” is first line therapy in young patients (<55) without alarm signs or symptoms in regions with an <i>H. pylori</i> prevalence >10%	69%	69%	54%	84%	0.004
PPI trial is next therapy in young patient failing <i>H. pylori</i> test-and-treat	52%	62%	39%	33%	<0.01
It is inappropriate to administer antibiotics for <i>H. pylori</i> without first testing for the presence of <i>H. pylori</i>	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

Table 3. Comparison of beliefs about functional dyspepsia among dyspepsia experts, community gastroenterologists (GIs), General Internal Medicine (GIM) physicians, and Nurse Practitioners (NPs). Data represent the percentage of respondents from each group who either “agree strongly” or “agree completely” with each stated belief about functional dyspepsia.

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

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

Table 4. Comparison of beliefs about potential adverse effects of long-term proton pump inhibitor (PPI) use among dyspepsia experts, community gastroenterologists (GIs), General Internal Medicine (GIM) physicians, and Nurse Practitioners (NPs). Data represent the percentage of respondents from each group who were at least “moderately concerned” about each potential PPI adverse effects.

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
<i>Clostridium difficile</i> 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

APPENDIX

C L I N I C A L V I G N E T T E N O 1

PATIENT HISTORY

A 44 year old man presents to your office complaining of intermittent abdominal discomfort for the last 12 months. He describes the discomfort as "fullness" after meals, which he localizes to the epigastrium. He does not have a history of heartburn, epigastric pain, dysphagia, or vomiting. His weight has been stable. He is not taking any NSAIDs or aspirin and has no history of peptic ulcer disease. He has no history of fever, chills, night sweats, melena or hematochezia.

He has no significant past medical history. He has no allergies and takes no medications. He does not smoke. He reports social alcohol use. He has no family history of GI malignancy.

PHYSICAL EXAMINATION

He is 5'8" and 190 lbs (77 kg). His vital signs are normal. He has no abdominal tenderness to palpation, has normal bowel sounds and no masses are palpated. His stool is guaiac negative. The remainder of his examination is normal.

C L I N I C A L V I G N E T T E N O 2

PATIENT HISTORY

A 47-year old woman presents to your office complaining of intermittent epigastric pain occurring at least once weekly for the last 12 months. The pain lasts approximately 30 minutes and is not relieved or exacerbated with food. She has no heartburn, nausea, bloating, dysphagia, or vomiting. Her weight has been stable. She has no history of peptic ulcer disease. She has no history of fever, chills, night sweats, melena or hematochezia.

Her past medical history is significant for chronic low back pain for which she has been taking longstanding ibuprofen 800mg TID. She does not take any other medications.

She does not smoke and reports social alcohol use. She has no family history of GI malignancy.

PHYSICAL EXAMINATION

She is 5'2" and 130 lbs (59 kg). Her vital signs are normal. She has no abdominal tenderness to palpation, has normal bowel sounds and no masses are palpated. Her stool is guaiac negative. The remainder of her examination is normal.

C L I N I C A L V I G N E T T E N o 3

A 58 year old woman presents to your office complaining of intermittent abdominal discomfort for the last 6 months. She localizes it to the epigastric region and reports nausea and bloating. She has no heartburn, vomiting or dysphagia. She has not had any weight loss. She is not taking any NSAIDs or aspirin and has no history of peptic ulcer disease. She does not have fever, chills, night sweats, melena or hematochezia. Physical exam is within normal limits. Her stool guaiac test is negative.

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