Response to reviewer #1:

Thank you for your review and comments on our paper. You raise several key questions regarding effective patient-provider communication as it relates to the management of GERD. We have made the following edits to our paper based on your feedback:

"What is the precise role of the communication between physician and patients in the accuracy of the diagnosis of GERD?" We have added a discussion of about the accuracy of the diagnosis of GERD and the role of provider-patient communication:

In most cases the diagnosis is presumptive. The accurate diagnosis of GERD relies on the careful questioning of the patient by the provider. Many patients do not report their symptoms of GERD and receive no treatment[15]. Facilitating effective communication between patient and provider at the beginning of treatment has been shown to improve patient experience and satisfaction. The presence of typical and atypical symptoms and the absence of alarm symptoms is considered an indication for empiric therapy[13].

"Does the PPI treatment affect the patients' feeling and communication with their doctors during therapy?" We have also added discussion of the importance of communicating the relative risks and benefits to PPI therapy in both PPI responders who may be able to taper off treatment successfully as well as communicating with PPI non-responders about alternate management strategies:

The frequent lack of clinical correlation between the patient's perception of typical symptoms and episodes of reflux points to the complex nature of GERD symptom production which will be explored in detail in later sections.

Overuse and misuse of PPIs leads to needless expense, increased risk, and no benefit to patient experience or satisfaction. Providers must take the time to communicate the relative risks and benefits of PPI treatment, especially the benefits of discontinuation.

"Some GERD patients do not respond to PPI treatment as expected, so how to evaluate the impact of communication on it?" Patient education and effective provider communication are covered in greater detail in the patient-centered communication section as well as the shared-decision making section:

There is very limited research on physician-patient communication within the context of GERD. Research has shown a disparity between patients and providers regarding GERD management and its impact. Patient satisfaction with prescription treatment for symptom management is often overestimated by providers[57-61]. The severity of symptoms are often underestimated by providers when compared to patients' reports[59, 62]. There is also a disconnect with what providers and patients see as most problematic symptoms for QOL[57]. This

evidence supports the need for a more patient-centered approach to GERD management and better communication between patients and providers.

In a study of the impact of patient education and GERD management, a survey of outpatients indicated that only 66% of patients thought they had a comprehensive discussion of factors affecting GERD with their physician[63]. These patients are also significantly more knowledgeable about when to take their medication than those who did not have a comprehensive discussion with their physician. This emphasizes the need for better discussion between physician and patient.

"As for the refractory GERD, how to improve the therapy result by enhancement of communication?"

Physicians have to treat the whole person and focus on the patient experience. Physicians must recognize these underlying patient dynamics and not ignore or discount them. More PPI, more testing or surgery is not the answer. However, suggesting their symptoms are due to their anxiety is not helpful either. Patients as a rule do not react well to being told that their symptoms are "all in their head" as it communicates their doctor is not taking them seriously or minimizing their suffering. Instead, physicians should provide education and assurance. Education about the origin of the symptoms should include an explanation of the brain-gut axis and an explanation on how hypersensitive gut nerves can be responsible for their symptoms. Usually pain and discomfort are symptoms that warn us for harm, but in this case, the nerves may be over responding and the signal (pain) is not useful anymore. Reassurance that there is no need for continued testing, surgery or even PPI or other medication treatment is needed as well.

Overuse and misuse of PPIs leads to needless expense, increased risk, and no benefit to patient experience or satisfaction. PROs can help physicians track this initial treatment response and better engage patients in an ongoing conversation about their troublesome symptoms and QOL. One study revealed that physicians alter their treatment decision 35% of the time based on information gleaned from the GIS (a common PRO)[59]. Clinicians need to find efficient, effective ways to gather critical clinical information from patients. PROs may be one of many tools clinicians can use to promote dialogue with patients about their symptoms and treatment priorities in the context of the SDM patient encounter.

Lifestyle modifications remain a potent but often neglected area of treatment recommendation and disease modification for GERD patients. Providers should return again and again to these proven strategies. Weight loss, smoking cessation, avoiding trigger foods, decreased alcohol use, avoiding late night meals and elevating the head of the bed have all been shown to reduce GERD symptoms and improve QOL[24]. Continued engagement with patients on these conservative,

lifestyle management strategies promotes patient self-management and has been shown to improve perceived symptoms[76,77]. The SDM approach can help facilitate a conversation with the patient on lifestyle changes. While a detailed discussion is outside the scope of this article, Motivational Interviewing may also be a supporting technique for use in the SDM patient care approach[78].

By applying SDM principles in the management of GERD, both the generalist and specialist can target specific areas where physicians have frequently been shown not to follow treatment guidelines. It also could decrease the chance of a breakdown in patient-physician communication.

"Describe how to get better communication between the patients and physician"We have tried to address your concerns by describing specific techniques to engage and communicate better with patients around their GERD symptoms and treatment:

Physicians have frequently been shown to underestimate the severity and impact of GERD symptoms on their patient's lives while simultaneously overestimating treatment effects[57,66]. Systematically tracking patient response and patient experience fosters a collaborative discussion between physician and patient. Patients are more likely to be satisfied if they feel they are taken seriously by their physician as well as if the consultation is interactive[67].

Employing validated PRO instruments at diagnosis and during ongoing pharmacotherapy demonstrates physician concern for the GERD patient. Patients feel that their physician is serious about providing enduring symptom relief when they monitor their progress over time. Additionally, if treatment is not successful, physicians recognize treatment failures faster allowing them to adjust treatment strategies. In some treatment refractory patients this may include behavioral health referral for gut-centered cognitive behavioral therapy. Patients may be much more receptive to this discussion and referral if the physician has been employing PRO tools during ongoing care and use these as part of shared-decision making (SDM).

Bytzer highlighted elements on how a physician can improve patient satisfaction in GERD treatment: improve communication between physician and patient in addition to providing accurate diagnosis and effective treatment, encouraging adherence, and managing patient expectations[67]. In often rushed clinical encounters, the patient and provider often collude in minimizing patient concerns and symptoms: the patient does not want to disappoint the doctor and so may not proactively discuss continuing troublesome symptoms and the provider misinterprets the patients' lack of complaint as treatment success and moves on, thereby missing opportunities to optimize care and patient satisfaction. This kind of dysfunctional communication dynamic spans across

medical disciplines. In order to combat this lack of patient-provider communication, experts have proposed a new model for clinical practice: shared-decision making (SDM).

Shared-decision making (SDM) aims to create a two-way partnership between patient and clinician encouraging not only the exchange of information but also factoring in patient values and treatment preferences. At its core, to be considered SDM, care must include a discussion of the treatment options and the pros and cons of each relevant option, a discussion of patient values and preferences, and finally a mutual decision by patient and provider including follow-up plans. Put more simply, SDM is a process, a conversation between the clinician and patient who, jointly, arrive at a solution to the patient's problem[68]. Many providers already engage patients in some of these processes, however all of these elements must occur in the clinical encounter for the care to be considered SDM. Studies assessing provider adherence to SDM principles and care have demonstrated clinicians often overestimate their level of patient engagement and involvement.

Medication adherence and proper dosing including the time of dose, also need to be monitored and addressed with patients. The SDM approach encourages patients to share their concerns and includes their experience as a central part of care decisions. Finally, optimal care, which includes SDM approaches, should include basic patient education about the brain-gut bidirectional pain pathway. This educational information can provide the patient with a framework to understand that not all of their symptoms will resolve. Utilizing the SDM process can help clinicians optimize treatment, but may also help the patient understand, accept, and manage residual persisting symptoms potentially avoiding unnecessary invasive testing and expense.

Response to reviewer #2:

Thank you for your close reading of our article.

We have edited the "Diagnosis of GERD" section based on your comments.

1) "please make sure the citation was correct;" As you noted, the 2-3% number should have referred to acid reflux events not all "patients" with GERD. We have clarified that section as follows:

Counterintuitively, studies have demonstrated that patients are consciously aware of only 2 to 3 percent of acid reflux events[15].

2) “Please make some comments about [ambulatory pH impedance monitoring diagnositic] method:” We have added more discussion of the use of pH-impedance testing as suggested:

The upper GI endoscopy is usually reserved for evaluation of GERD-associated complications and placement of wireless pH probes. Wireless pH probes are used in ambulatory 24-hour pH monitoring allowing direct measurement of esophageal exposure to gastric acid. This diagnostic method can be used to quantify a reflux frequency and provide information on the association between the timing of symptoms and actual reflux episodes[8]. The widespread use of 24-hour pH probes has led to the identification of a subset of patients with typical GERD symptoms who do not respond to PPI’s. These PPI-refractory symptoms have been shown, with the use of pH-impedance testing, to be related to continued episodes of reflux[47]. This testing method has also demonstrated that only 5-15% of reflux events correspond to patient symptoms[47]. One advantage of this diagnostic procedure is that it is associated with very little discomfort to patients allowing them to resume their normal lives during the testing period[17-19].