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High Economic Burden of Caring for Patients With Suspected Extraesophageal Reflux

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- OBJECTIVES:** Extraesophageal symptoms are common manifestations of gastroesophageal reflux disease (GERD). Lack of a definitive diagnostic or treatment standards complicate management, which often leads to multiple specialty consultations, procedures, pharmaceuticals and diagnostic tests. The aim of this study was to determine the economic burden associated with extraesophageal reflux (EER).
- METHODS:** Direct costs of evaluation were estimated for patients referred with symptoms attributed to EER between 2007 and 2011. Medicare payment for evaluation and management and pharmaceutical prices was used to calculate first year and overall costs of evaluating and treating extraesophageal symptoms attributed to reflux.
- RESULTS:** Overall, 281 patients were studied (cough (50%), hoarseness (23%), globus/post-nasal drainage (15%), asthma (9%), and sore throat (3%)). Over a median (interquartile range) of 32 (16–46) months follow-up, patients had a mean (95% confidence interval) of 10.1 (9.4–10.9) consultations with specialists and underwent 6.4 (3–9) diagnostic procedures. Overall, the mean initial year direct cost was \$5,438 per patient being evaluated for EER. Medical and non-medical components contributed \$5,154 and \$283. Of the overall cost, 52% were attributable to the use of proton pump inhibitors. During the initial year, direct costs were 5.6 times higher than those reported for typical GERD (\$971). A total of 54% of patients reported improvement of symptoms. Overall cost per improved patient was \$13,700.
- CONCLUSIONS:** EER contributes substantially to health-care expenditures. In this cohort, the cost for initial year's evaluation and treatment of EER symptoms was quintuple that of typical GERD. Prescription costs and, in particular, proton pump inhibitors were the single greatest contributor to the cost of EER management.

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INTRODUCTION

An estimated 40% of US population is affected by gastroesophageal reflux disease (GERD) (1). It is associated with clinically important reduction in quality of life (2) and if untreated may result in serious complications such as peptic strictures, Barrett's esophagus, and esophageal adenocarcinoma (3). Treatment with acid suppressive therapy results in improved quality of life (4) and can prevent serious complications (5). Currently, this is achieved with a high expenditure of resources. Annual direct cost for GERD management is cited at \$971 per patient (6) with national

expenditures ranging from \$9.3 billion (7) to \$12.1 billion (8). Ubiquity of GERD and wide employment of anti-reflux medication has elevated acid-suppressive agents, such as proton pump inhibitors (PPIs), to be the leading pharmaceutical expenditure in the United States. In 2004, GERD was the second most costly upper gastrointestinal diagnosis with PPI use accounting for over half of the associated drug expenditure (\$7.7 billion) in the United States (8).

Burgeoning of clinical entities attributed to GERD has occurred over the past 20 years. These include many ear, nose and throat,

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pulmonary and allergic symptoms, which are collectively termed extraesophageal reflux disease (EER) (9). Empiric PPI trials are often started on patients with suspected EER even in the absence of concomitant typical GERD symptoms (i.e., heartburn and regurgitation) or physiologic confirmation for the presence of reflux disease. GERD as the source for many of these chronic non-typical symptoms remains largely experiential (10). The clinical consequence of expanding GERD diagnoses to include extraesophageal presentations is over-diagnosis and misdiagnosis of reflux as the etiology for patients' chronic symptoms.

Vagaries of its presentation and lack of an objective diagnostic gold standard often begets extensive evaluation involving multiple specialty consultations, procedures, diagnostic tests, and medication use. As a result, the management of patients with suspected EER has the potential to be costly. However, to date, there are no studies assessing the health-care expenditures associated with care of this patient group. Thus, the goal of this study was to estimate the cost associated with the evaluation and management of a group of patients with extraesophageal-associated symptoms at a tertiary referral center. Estimating overall direct cost requires capture of both medical and non-medical components. Direct medical costs include costs related to services associated with evaluation and management (diagnostic tests, procedures, treatments, and pharmaceutical costs). Non-medical direct costs relate to travel to appointments and missed work. The economic burden of disease may be best estimated by combining the cost components, as we show in this study.

METHODS

The study was performed in accordance with the Declaration of Helsinki, Good Clinical Practice, and approved by the Vanderbilt Institutional Review Board (IRB# 100804) (NCT01204931).

Study design and patient population

Vanderbilt Multidisciplinary Extraesophageal Group is a consortium of providers dedicated to the care of patients with symptoms attributed to EER. It is comprised of three specialty centers: Digestive Disease Center, Voice Center and the Allergy, Sinus and Asthma Program (ASAP). Patients with extraesophageal symptoms are referred to any of the above centers for initial evaluation. From the initial consultation, patients' symptoms are triaged to the appropriate center(s) for evaluation and management. The present study population consists of those initially referred to the Digestive Disease Center (2007–2011) for evaluation of GERD's potential contribution to the patients' extraesophageal symptoms. All patient data were collected prospectively. The following were recorded for all participants: presence, severity and frequency of extraesophageal symptoms, current medications (prescribed and over-the-counter), subject demographics (age, sex, and race), and presence of voice/throat/nasal/pulmonary symptoms. Excluded were those with chief presenting symptom of classic GERD (heartburn \pm regurgitation) or with a history of Barrett's esophagus, prior surgical fundoplication, achalasia, or alcoholism.

Initial evaluation for possible reflux as the contributing factor to patients' extraesophageal symptoms typically involved (i) esophagogastroduodenoscopy with or without wireless 48-h pH testing off acid suppression, and/or (ii) 24-h impedance/pH monitoring on b.i.d. PPI therapy. Adjunctive tests or subsequent intervention were deemed necessary based on symptoms and test results. Once gastrointestinal-related causes were excluded, patients were referred, when appropriate, to the ASAP and/or the Voice Center for further evaluation. Patients' chief complaints were assessed at each subsequent visit to the specialty centers. Symptoms were rated as resolved (complete elimination of chief complaint) and improved (greater than 50% better), stable (no change) or worse (increase in severity or frequency). The symptom changes were grouped, based as worsened/stable or improved/resolved. Symptom rating at the last clinic visit was used for analyses.

Estimating costs

The number of office visits and consultations at each of the specialty centers (Digestive Disease Center, ASAP clinic, and Voice Center) were recorded from the date of initial presentation to the Digestive Disease Center. Medicare evaluation and management (E&M) pricing was used to calculate the range of the direct medical cost of visits (initial consultation vs. return visit) and procedures and tests performed (Table 1). To provide a national perspective, ranges of Medicare payments for services are provided from minimum Medicare facility payment to the maximum Medicare non-facility payment (11,12) (Table 1). However, for estimation of cost and data discussion only the more conservative minimum Medicare facility payment is outlined. Medications prescribed or taken over-the-counter for the treatment of extraesophageal symptoms were extracted from each patient's medical chart. Minimum pharmaceutical costs were identified (13) and used to determine cost per patient (Table 2).

Non-medical direct costs were estimated. These are costs associated with lost or impaired ability to work due to morbidity (14,15). Owing to scarcity of reliable data, we could not assess indirect societal costs related to lost productivity. Therefore, only productivity losses caused by time away from paid labor resulting from accessing health care were estimated in this study. Inpatient hospital stay for a patient of working age (16–64 years) was assumed to represent 1 missed workday. The following assumptions were made: ambulatory visits were 2 h and 1-day (8 h) for procedures requiring sedation, general or monitored anesthesia, or sedation care. Assumed hours were compiled for each patient to estimate days of work lost. Work loss time was valued based on the 2010 National Statistical Abstract, which provides information on average hourly wage (16). In 2010, this value equaled \$21.29, which was applied to our cohort of patients to estimate the direct non-medical cost of their care.

Statistical analysis

Patient demographics, frequency and type of clinic visits, procedures and medication prescribed were recorded in the secure

Table 1. Medicare pricing range (minimum and maximum) for clinic visits and procedures

Procedure	CPT	Range of payments (outpatient) ^a	
		Minimum price (facility)	Maximum price (non-facility)
Initial specialty consultation	90202	\$42.40	\$90.10
Return visit	90212	\$21.75	\$52.01
EGD (for diagnosis)	43235	\$353	\$917
EGD with biopsy	43239	\$353	\$917
EGD with dilation	43450	\$265	\$546
Bravo	91035	\$73.64	\$666.76
Impedance	91034	\$44.89	\$260.78
Manometry	91010	\$59.39	\$239.76
Pulmonary function test	94010	\$7.26	\$46.83
Sinus CT	70487	\$56.15	\$395.56
Allergy test ^b	95004	\$4.35	\$8.41
Chest X-ray	71020	\$27	\$61
Chest CT with IV contrast	71260	\$53.65	\$383.65
Nissen fundoplication	43280	\$873.25	\$1,364.12
Sinus surgery (total ethmoidectomy)	31255	\$339.79	\$525.36
Abdomen CT	74170	\$60.56	\$554.00
Video fluoroscopic swallow study	74230	\$22.91	\$121.42
Esophagram	74240	\$32.84	\$150.58
Bronchoscopy	31622	\$125.66	\$396.73
Stroboscopy	31579	\$118.89	\$265.95
Flexible Laryngoscopy	31575	\$62.92	\$145.01

CT, computed tomography; CPT, current procedural terminology; EGD, esophagogastroduodenoscopy; IV, intravenous.

^aAll modifiers.

^bFifteen skin tests were performed.

web-based Vanderbilt Digestive Disease Center REDCap (Research Electronic Data Capture) (1 UL1 RR024975 NCRR/NIH). REDCap is an application designed to support data capture for research studies providing (i) an intuitive interface for validated data entry; (ii) audit trails for tracking data manipulation and export procedures; (iii) automated export procedures for seamless data downloads to common statistical packages; and (iv) procedures for importing data from external sources. There was strict control and supervision of the data entry and access for this study.

Data management and statistical evaluation was performed using STATA SE (STATA Corp, College Station, TX). Patient characteristics (age, gender, body mass index), presenting extraesophageal symptoms and duration of follow-up were

Table 2. Medications (dosing and price) prescribed to treat extraesophageal symptoms in the study

Class	Medication	Dose	Monthly price ^a
Oral antihistamines	Loratidine	10 mg	\$6
	Cetirizine	10 mg	\$6
	Desloratidine	5 mg	\$153
	Fexofenadine	60 mg	\$27
	Levocetirizine	5 mg	\$90
	Diphenhydramine	25 mg	\$8
Nasal antihistamine	Pseudoephedrine	30 mg	\$12
	Azelastine	137 mcg	\$134
Nasal steroids	Fluticasone	50 mcg	\$60
	Triamcinolone	55 mcg	\$106
	Mometasone	50 mcg	\$131
	Budesonide	32 mcg	\$116
	Ciclesonide	50 mcg	\$120
	Proton pump inhibitor	Omeprazole	40 mg/40 mg b.i.d.
Proton pump inhibitor	Lansoprazole	30 mg/30 mg b.i.d.	\$195/\$390
	Rabeprazole	20 mg/20 mg b.i.d.	\$100/\$200
	Pantoprazole	40 mg/40 mg b.i.d.	\$250/\$500
	Esomeprazole	40 mg/40 mg b.i.d.	\$16/\$32
	Esomeprazole	40 mg/40 mg b.i.d.	\$185/\$370
	H2 blockers	Ranitidine	150 mg
H2 blockers	Famotidine	10 mg	\$12
	Cimetidine	300 mg	\$8
	Cimetidine	300 mg	\$6
Steroid inhalers	Fluticasone/salmeterol	100–50 mcg	\$190
	Mometasone	100–5 mcg	\$219
	Budesonide	90 mcg	\$122
	Beclomethasone	40 mcg	\$116
	Budesonide/formoterol	4.5 mcg	\$205
	Fluticasone	27.5 mcg	\$113
	Triamcinolone	55 mcg	\$106

^aBased on drugstore.com/lexi-comp minimums.

recorded for each patient. The frequency and types of office visits, procedures/diagnostic tests, and the duration and type of medications were determined per patient. The boot package in R version 2.15.1 was used to calculate nonparametric bootstrap confidence intervals (CIs) for mean direct medical and non-medical costs.

Table 3. Annual and overall study duration median (interquartile range) number of office visits and procedures as well as minimum and maximum Medicare pay per patient

	Annual			Overall (2007–2011)		
	Median (#)	Minimum cost	Maximum cost	Median (#)	Minimum cost	Maximum cost
Office visits	4 (2.18–6)	\$119.26 (\$64.15–\$177.79)	\$259.91 (\$142.11–\$388.24)	8 (6–13)	\$235.95 (\$171.80–\$389.30)	\$530.35 (\$388.24–\$836.48)
Procedures	2.22 (1.25–4)	\$238.70 (\$118–469.79)	\$846.32 (\$411.47–\$1,589)	5 (3–9)	\$599 (\$423–838.79)	\$2,151 (\$1,374.76–3,075.76)

RESULTS

Patient characteristics

Overall, 281 patients met inclusion criteria (mean (95% CI) age of 54.4 years (52.8–56.0), 72% were female with a mean (95% CI) body mass index of 29.6 (28.8–30.5)). Most common presenting symptoms were cough (50%) or hoarseness (23%) followed by globus/post-nasal drainage (15%), asthma (9%), and sore throat (3%). Median duration of follow-up was 32 months (16–46). Esophagogastroduodenoscopy (70%), pulmonary function testing (49%), wireless pH testing (49%), and sinus computed tomography (44%) were the most common procedures used in this cohort.

Costs

Office visits/procedures. The first year and overall (5-year) Medicare payment ranged from minimum to maximum for office visits, and procedures per patient are shown in **Table 3**. During the 5-year study period, patients had a mean (95% CI) of 10.1 (9.4–10.9) office visits and 6.4 (5.9–7.0) procedures/diagnostic tests (annually 4.6 (4.2–5.0) office visits and 2.9 (2.7–3.2), respectively, **Table 3**). In the first year of evaluation, the mean (95% CI) cost of (i) office visits ranged from minimum \$140 (\$127–\$156) to maximum \$298 (\$274–\$329); and (ii) procedures ranged from minimum \$315 (\$284–\$351) to maximum \$1,081 (\$981–\$1,193) (**Table 3**). The first year expenditure for office visit and procedures accounted for 47% of the overall 5-year expenditure.

Pharmaceuticals. Mean (95% CI) pharmaceutical prices per patient in the first year of evaluation and overall are presented by medication class in **Table 4**. During the initial evaluation year, pharmaceutical cost per patient was \$4,700 (\$4,373–\$5,026). PPIs accounted for greater than 61% of total pharmaceutical costs of treating patients with extraesophageal symptoms. Importantly, the median (interquartile range) duration patients were on PPI therapy was 13 months (3–30). The first year expenditure accounted for 44% of the overall 5-year pharmaceutical cost (**Table 4**).

Total costs. In the initial year of evaluation, the mean (95% CI) total cost per patient with EER symptom was \$5,438 (\$5,098–\$5,773; **Table 5**). The majority (95%) was related to direct medical costs (mean (95% CI) per patient: \$5,154 (\$4,821–\$5,485)) with 91% attributable to pharmaceutical expenses.

Table 4. Mean (95% confidence interval) annual and overall 5-year study duration pharmaceutical pricing per patient

Medication class	First year	Overall (2007–2011)
Proton pump inhibitor	\$2,853 (\$2,624–\$3,079)	\$6,480 (\$5,703–\$7,334)
Nasal steroids	\$549 (\$494–\$608)	\$1,276 (\$1,100–\$1,479)
Oral antihistamine	\$98 (\$75–\$135)	\$251 (\$178–\$394)
Steroid inhalers	\$635 (\$531–\$748)	\$1,399 (\$1,103–\$1,761)
Nasal antihistamine	\$551 (\$471–\$637)	\$1,305 (\$1,058–\$1,595)
H2 blockers	\$14 (\$11–\$18)	\$20 (\$14–\$30)
Total	\$4,700 (\$4,373–\$5,026)	\$10,730 (\$9,615–\$11,953)

Outcomes

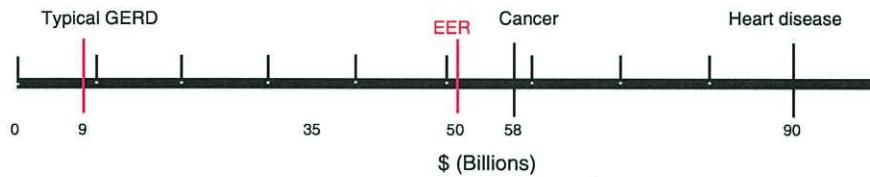
The management's effect on the chief EER complaint was assessed at the last visit to the specialty clinics. A total of 54% patients' EER symptoms improved or resolved, while the remainder remained stable or worsened over the 5-year period. There was no difference in EER chief complaints between outcome strata ($P = 0.67$). Percent of chief complaints that improved/resolved compared with those who remained stable or worsened are as follows: cough (49% vs. 58%), hoarseness (26% vs. 22%), post-nasal drip symptoms (13% vs. 12%), and asthma (12% vs. 6%). The overall (5-year) cost per patient whose primary symptom improved/resolved was \$13,700 (\$11,718–\$15,683) compared with \$12,137 (\$9,812–\$14,462) for patients whose primary symptom remained stable or worsened.

DISCUSSION

This is the first study to critically assess the economic burden of EER-associated symptoms in the United States. During the initial year of EER evaluation, we found that efforts to diagnosis and treat patient symptoms had an overall mean direct cost of \$5,438 per patient, which is 5.6 times the annual cost of typical GERD (\$971) (6). Thus, with an estimated annual cost of treating GERD

Table 5. Mean (95% confidence interval) first year and overall 5-year costs (direct, non-medical and total) by contributing component based on minimum and maximum Medicare fees

Costs	Component	First year		Overall (2007–2011)	
		Minimum	Maximum	Minimum	Maximum
Direct	Pharmacy	\$4,700 (\$4,373–\$5,026)	\$4,700 (\$4,373–\$5,026)	\$10,730 (\$9,615–\$11,953)	\$10,730 (\$9,615–\$11,953)
	Procedure	\$315 (\$284–\$351)	\$1,081 (\$981–\$1,193)	\$675 (\$617–\$741)	\$2,302 (\$2,126–\$2,491)
	Clinic	\$140 (\$127–\$156)	\$298 (\$274–\$329)	\$304 (\$280–\$332)	\$651 (\$605–\$704)
	Total	\$5,154 (\$4,821–\$5,485)	\$6,080 (\$5,719–\$6,434)	\$11,709 (\$10,563–\$12,960)	\$13,684 (\$12,474–\$11,393)
Non-medical	Lost wages	\$283 (\$261–\$308)	\$283 (\$261–\$308)	\$612 (\$571–\$656)	\$612 (\$571–\$656)
Total		\$5,438 (\$5,098–\$5,773)	\$6,363 (\$5,992–\$6,727)	\$12,321 (\$11,152–\$13,594)	\$14,295 (\$13,060–\$15,630)

**Figure 1.** Comparison of estimated economic burden of extraesophageal reflux (EER) with typical GERD, cancer, and heart disease.

at \$9.3 billion and a similar prevalence of GERD and EER, expenditures for EER could be over \$50 billion (Figure 1). In our study, pharmaceuticals accounted for 86% of that cost and were thus the most expensive component of care. Of these, 61% of expenditures were attributable to PPI use. This is similar to prior reports in patients with typical GERD (7) where drug therapy accounted for 63% of the total direct cost; however, in our study the total cost for the care of patients with EER symptoms is significantly more than those with patients with classic heartburn and regurgitation. This is directly related to multifactorial nature of the disease as well as poor diagnostic tests and suboptimal therapies for this group of patients. Lack of a diagnostic standard for EER makes its true annual incidence elusive.

The high cost described in this study likely stems from continued uncertainty over EER diagnosis and management. A cogent definition of EER remains elusive despite being proposed as a disease process over 20 years ago (17,18). Since its description, many refractory and sometime vague conditions in the upper and lower aerodigestive tract have been attributed to GERD and labeled EER. Because of this ambiguity, a gold standard diagnostic test remains an aspiration. Attempts to determine the etiology of EER symptoms often requires multiple medical and surgical consultants and diagnostic tests. In the current study, patients had an average of 10 specialist office visits (consultations + follow-up visits). Despite the tertiary study setting and investigators' determination to identify symptom etiology, the number of office visits and procedures described herein may represent a conservative estimate. EER care in private practice settings may predispose to more redundancy in specialty consultations and procedures in addition to the ultimate referral of this difficult group of patients to subspecialty centers.

Treatment of extraesophageal symptoms is often empiric and targeted at specific conditions of the upper aerodigestive tract (i.e., hoarseness, allergy, chronic cough, dysphagia, and dyspnea). Each of these symptoms elicits individualized pharmacological intervention with quite varied results. This can lead to issues related to polypharmacy with the requisite side effects. The most conservative and perpetuated recommendation for patients with suspected EER is empiric treatment with 2–3 months of twice daily PPIs (10). Symptom response is often used as proof of EER as the underlying etiology. However, tracking degrees of symptom response is time-intensive and wrought with subjectivity. Compounding matters is that patients are often left on their PPI therapy for prolonged periods or indefinitely despite lack of symptom response to initial empiric treatment, thus inflating the overall cost of EER care. Based on our data we recommend careful consideration of treatment duration in this group of patients, and early testing may prove useful in eliminating the unnecessary prolonged therapy in those who are found not to have GERD by physiologic testing.

Pharmaceuticals remain the overwhelming driver of GERD costs. For example, a recent study assessing the overall burden of digestive diseases found GERD to be the most costly (\$12.1 billion) of the digestive diseases with over half of drug expenditure being PPI use (8). The PPI market in the United States is more than \$10 billion dollars per year with substantial growth in the past decade due to variety of factors, including increasing prevalence of GERD, the effectiveness of PPIs in treating GERD, as well as the perception of overall safety (19). However, despite their therapeutic edge over other forms of acid-suppressive therapy, there is evidence of PPI overuse (20,21). One study illustrated this by showing that a

substantial proportion (80%) of patients maintained on more than once daily PPI dose can be effectively controlled on once daily dose without worsening of symptoms (20).

Several unique aspects to the current study need to be highlighted. (i) Lack of clarity in disease definition makes accurate incidence and prevalence estimates difficult. EER does not have distinct International Classification of Disease Version 9 (ICD-9) code or consistent discrete diagnostic criteria. Therefore, epidemiological estimates of burden of disease are variable. Some advocates of the disease argue it is ubiquitous, while others question its very existence. In this study, our data are based on actual patient experience during their evaluation and treatment of symptoms attributed to EER, thereby representing the patient population encountered in clinical practice. We enrolled those unresponsive to PPI therapy, as this is the group in which diagnostic testing is currently recommended (10). If all symptoms under the umbrella of EER are taken into account, national prevalence and cost estimates are likely higher than those presented in this study. (ii) We believe that the expertise of our Extraesophageal Group provides more efficient diagnosis and treatment and thereby minimizes costs, by reducing redundancies in testing and referrals commonly encountered in community practice. (iii) Medicare costs were used in this study in order to standardize costs. Complicating the use of Medicare cost is the range of payments that occur nationally based on geography, service, and facility type. This study addressed inherent variability by presenting cost estimates as ranges. In all analyses, minimum facility pricing was used to estimate visit and procedure costs. Community practices (non-facilities) not affiliated with hospitals typically are reimbursed at higher Medicare prices, resulting in higher estimates for costs associated with the care of patients with suspected EER. Despite the impressive costs reported in this study, our results are conservative and underestimate actual costs. Medicare typically reimburses at lower rates than private insurers. Pharmacy costs employed in this analysis were market minimums. Incorporation of private insurer pricing and more realistic varied payer mix would inflate the economic burden of this condition. Moreover, costs associated with anesthesia, hospitalizations, and other variable services could not be fully addressed in this analysis. Therefore, it may be argued that the annual economic burden of EER proposed here is just “the tip of the iceberg.”

In summary, the present study is the first to estimate the direct economic burden of evaluating and treating patients suspected of having EER. PPI use appears to be a major driver of cost and more discretionary prescribing patterns are necessary to limit the national economic burden of this disease. EER remains a difficult and, at times, nebulous diagnosis. However, its enormous associated cost to both patients and society should promote further effort to define or refute its existence as a disease entity.

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CONFLICT OF INTEREST

Guarantor of the article: Michael F. Vaezi, MD, PhD, MSc (Epi).

Specific author contributions: David O. Francis: study concept, design, technical and material support, and manuscript preparation; Jennifer A. Rymer: design, technical and material support, and manuscript preparation; James C. Slaughter: design and conduct of data analysis; Yash Choksi, Pawina Jiramongkolchai, Evbu Ogbeide, Christopher Tran, and Marion Goutte: patient, technical, and material support; C. Gaelyn Garrett and David Hagaman: Patient identification and referral; and Michael F. Vaezi: study concept, design and manuscript preparation. We are sincerely grateful to John M. Inadomi, MD, for his council, expertise and critical review of the present study.

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Study Highlights

WHAT IS CURRENT KNOWLEDGE

- ✓ Gastroesophageal reflux disease often results in extra-esophageal symptoms such as chronic cough, asthma, and laryngitis.
- ✓ Empiric therapy with proton pump inhibitors (PPIs) is the recommended initial approach in this group of patients.
- ✓ However, many patients do not respond to PPI therapy and the current diagnostic testing are suboptimal in establishing causation between patients' symptoms and gastroesophageal reflux disease (GERD).

WHAT IS NEW HERE

- ✓ Our study is the first to assess the cost of managing this commonly encountered group of patients.
- ✓ We find that the health-care cost in this group is enormous and estimated at five times that of managing patients with typical GERD.
- ✓ We also show that the predominant driver of cost is inappropriate and over use of PPI therapy.
- ✓ Our data emphasize the importance of reducing dosing and frequency of PPI therapy in patients with suspected extra esophageal reflux.
- ✓ We hope our data will result in awareness of health-care cost associated with this important clinical entity and alter the clinical approach in caring for this group of patients.

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