The Clinical and Economic Burden of Irritable Bowel Syndrome

by Anthony J. Lembo

Irritable bowel syndrome (IBS) is one of the most frequently diagnosed gastrointestinal disorders in primary care and gastroenterology practices. Research findings have provided a greater understanding of the burden of IBS. Irritable bowel syndrome can substantially impact an individual's ability to function socially and professionally. The magnitude of impairment in quality of life is directly related to the frequency and severity of bowel symptoms, the presence of extraintestinal manifestations of IBS, and psychological symptoms. The total direct and indirect costs of IBS, estimated at $30 billion annually in the United States, are higher than for chronic conditions such as asthma. Findings demonstrating the clinical, humanistic, and economic burdens of IBS illustrate the need for a multidimensional approach to this illness to establish appropriate patient management strategies and reduce the economic burden of IBS to the patient, employer, and healthcare system.

KEY WORDS: irritable bowel syndrome, epidemiology, quality of life, healthcare utilization

INTRODUCTION

Irritable bowel syndrome (IBS) is one of the most frequently diagnosed gastrointestinal (GI) disorders in primary care and gastroenterology practices, despite the fact that many sufferers do not consult physicians about their symptoms (1,2). Over the previous decade, clinical research has enhanced the understanding of the negative impact of IBS on patients' quality of life and on the increasing direct and indirect costs associated with this illness. This article discusses the clinical and physiologic manifestations of IBS, the impact of symptoms on patients' well-being, and the economic burden of IBS.

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EPIDEMIOLOGY

Irritable bowel syndrome affects approximately 3%–20% of the US population (3,4). Additionally, IBS affects women approximately twice as often as

men, with a peak incidence in those between the ages of 15 and 34 years (3,4). Data from studies of twins demonstrated a higher concordance rate for IBS in identical twins compared with fraternal twins, suggesting that a genetic component may contribute to IBS (5,6). However, the role of genetic factors is still unknown.

The majority of patients with IBS are undiagnosed. In a 2005 US community-based study of 5,009 individuals, the prevalence of IBS meeting Manning, Rome I, or Rome II diagnostic criteria was 14%, with 77% undiagnosed (7). One possible explanation for this observation is that patients with IBS often experience other GI comorbidities, such as chronic constipation, functional dyspepsia, gastroesophageal reflux disease, celiac disease, and lactose intolerance (8). Comorbidity with physical conditions (e.g., fibromyalgia, chronic fatigue syndrome) and psychiatric disorders (e.g., depression, anxiety, panic disorder) is also common (8).

CLINICAL AND PHYSIOLOGIC MANIFESTATIONS

Irritable bowel syndrome is a functional disorder characterized by chronically recurring symptoms, including abdominal pain or discomfort, altered stool frequency and consistency, and abdominal bloating in the absence of structural or biochemical abnormalities (9). In a controlled clinical trial, more than 35% of 640 patients diagnosed with IBS cited abdominal pain as their most bothersome symptom, followed by fecal urgency (28%), frequency of bowel movements (22%), and abdominal bloating (12%) (10,11). Additionally, in a study evaluating a noninvasive method to estimate bowel gas in patients with IBS and functional bowel disorder, all patients (n = 18) reported abdominal pain or distention, and 89% scored a mean severity rating of ≥5 for abdominal bloating on a scale of 0 (none) to 10 (severe) (12).

Because of the complexity of IBS, several mechanistic explanations, including visceral hypersensitivity, abnormal colonic motility, abnormal brain-GI tract interactions, and immune activation, have been proposed to explain the heterogeneous symptoms of this disorder (9,13). In a 1980 pain threshold study, patients with IBS (n = 25) reported pain more often during rectosigmoid balloon distention compared with healthy individuals (n = 20) (14). In another study, patients with IBS were abnormally sensitive to visceral pain induced by colonic distention but not to somatic pain (15). Abnormal colonic motility is also a hallmark of IBS pathophysiology, manifested by more frequent and stronger bowel contractions and shorter colonic transit time among many patients with IBS compared with healthy individuals (9).

An additional characteristic of IBS pathophysiology is dysregulation of the brain-GI tract interaction. Neural control of the GI tract occurs at several physiological levels, including the enteric nervous system, prevertebral sympathetic ganglia, sympathetic and parasympathetic nervous systems, and higher brain centers (16,17). In IBS, neurotransmission at one or more of these levels of organization may be dysfunctional. Many chemical mediators, including dopamine, norepinephrine, serotonin, acetylcholine, substance P, calcitonin gene-related peptide, vasoactive intestinal peptide, and corticotropin-releasing factor, appear to play important roles in visceral sensation and GI motility (18,19).

Altered immune activation has also been found in many patients with IBS, with or without a known history of precipitating gastroenteritis (13,20,21). Furthermore, acute bacterial gastroenteritis associated with chronic mucosal inflammation and immune activation is a primary risk factor for development of IBS (20,21). These observations and the clinical overlap between clinical symptoms of IBS and inflammatory bowel disease have led to the hypothesis that IBS is a low-grade inflammatory bowel disease (13).

Recently, the occurrence of small intestinal bacterial overgrowth (SIBO) has emerged as a possible physiological mechanism of IBS (22). Evidence supporting this hypothesis includes clinical observations that symptoms of abdominal pain and bloating are present in most patients with IBS, that up to 84% of patients with IBS have abnormal breath test results following lactulose ingestion, and that eradication of SIBO with antibiotic therapy results in substantial improvement of IBS symptoms (22). In this regard, the pathology of SIBO serves as a platform for future research that may lead to more effective diagnostic and treatment strategies for individuals with IBS.

Table 1
Quality of Life of Patients With IBS Compared With Healthy Individuals and Patients With Other Chronic Diseases (27)

*SF-36 subscale**	*Patients w/ IBS (n = 877)*	*Healthy individuals (n = 2,474)*	*Patients w/ GERD (n = 516)*	*Patients w/ diabetes (n = 541)*	*Patients w/ depression (n = 502)*
Physical functioning	79.2 ± 22.4	83.8 ± 8.6**	79.7 ± 22.6	67.7 ± 28.7**	71.6 ± 27.2**
Role physical	49.9 ± 41.5	80.7 ± 9.3**	71.6 ± 37.6**	56.8 ± 41.7**	44.4 ± 40.3
Bodily pain	53.6 ± 24.9	73.9 ± 5.4**	58.1 ± 21.0**	68.5 ± 26.5**	58.8 ± 26.7**
General health	54.5 ± 23.3	71.5 ± 5.5**	67.7 ± 20.5**	56.1 ± 21.1	52.9 ± 23.0
Mental health	64.8 ± 19.8	74.5 ± 1.6**	71.2 ± 18.5**	76.7 ± 18.3**	46.3 ± 20.8**
Role emotional	64.8 ± 40.9	81.3 ± 3.0**	77.8 ± 35.2**	75.6 ± 36.6**	38.9 ± 39.8**
Vitality	44.0 ± 23.2	60.5 ± 2.8**	57.4 ± 19.9**	55.7 ± 21.6**	40.1 ± 21.1**
Social functioning	62.7 ± 27.7	83.1 ± 2.8**	79.1 ± 23.2**	82.0 ± 25.0**	57.2 ± 27.7**

GERD = gastroesophageal reflux disease; IBS = irritable bowel syndrome; SF-36 = Short Form-36 Health Survey.
*Scale of 0 to 100, with lower scores reflecting poorer quality of life; data are mean ± standard deviation; **p < 0.05 vs IBS group.
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QUALITY OF LIFE

Symptoms of IBS can substantially impact patients' quality of life. In studies employing the Short Form-36 Health Survey, which reliably measures generic aspects of health-related quality of life (23), patients with IBS (N = 2,610) reported substantially impaired quality of life (24–28). Furthermore, the effects of IBS on quality of life may be as substantial, if not more so, than those of other chronic diseases. In a study of 877 patients, those with IBS had significantly poorer scores for many quality of life factors, such as role physical (i.e., role limitations arising from physical problems), bodily pain, mental health, role emotional (i.e., role limitations arising from emotional problems), vitality, and social functioning, compared with patients with gastroesophageal reflux disease, diabetes mellitus, or depression (Table 1) (27).

The specific impact of IBS on health-related quality of life can be assessed with the greatest sensitivity using disease-specific measures, several of which have been developed and validated for use in patients with IBS (29–32). For instance, the Irritable Bowel Syndrome Quality of Life Questionnaire (IBSQOL) comprises 30 questions measuring nine dimensions of quality of life: emotional functioning, mental health, sleep behaviors, energy, physical functioning, diet, social role, role physical functioning, and sexual relations. In a survey of 126 patients who met Manning criteria for IBS, patients with self-reported severe symptoms (46%) scored substantially lower than patients with moderate symptoms (25%) on the physical functioning, role physical, role emotional, emotional functioning, social functioning, energy, and mental health dimensions of the IBSQOL (25).

In addition to severity of bowel symptoms, psychosocial and psychological factors may predict quality-of-life impairment in patients with IBS (24,33). For example, psychological symptom severity measured by the Symptom Checklist-90 Revised (SCL-90R) predicted quality-of-life impairment in a study of 257 patients with severe, refractory IBS (24). Multiple regression analyses indicated that poor SCL-90R

Table 2
Healthcare Utilization Among Patients With IBS Compared With the General Population*(37)

Study parameter	*Patients with IBS, % (95% CI) (n = 53)*	*General population, % (95% CI) (n = 10,787)*
Absenteeism from workplace or school due to illness during 2-month period	32** (20–48)	18 (17–19)
Consulted family physician during 2-month period	83** (64–100)	38 (37–39)
Mean number of visits to family physician during 3-month period	3.8** (3.0–4.6)	2.4 (1.8–3.0)
Mean number of visits to family PA	1.1 (0.6–1.6)	0.8 (0.7–0.8)
Consulted physical therapist during 1-year period	30** (19–46)	15 (14–15)
Consulted specialist during 2-month period	25 (15–39)	16 (15–17)
Consulted other therapist*** during 5-year period	32** (20–48)	15 (14–16)

CI = confidence interval; IBS = irritable bowel syndrome; PA = physician assistant.
*Data from the Dutch National Survey of Morbidity and Intervention in General Practice; **$p < 0.05$ vs general population;
***Therapist other than family physician, PA, or physical therapist.

somatization scores ($p < 0.0005$) and depression scores ($p = 0.03$), as well as severity of abdominal pain ($p < 0.0005$), age ($p < 0.0005$), and global symptom severity scores ($p = 0.002$), were significant, independent predictors of quality-of-life impairment.

These and other quality-of-life data have contributed to an emerging biopsychosocial model of IBS in which biological, psychological, and social factors contribute to the clinical presentation, course, and outcome of IBS (34,35). The biopsychosocial model is also supported by the findings that psychosocial factors such as life stress, psychological morbidity, and history of abuse may predict the frequency and severity of bowel symptoms, healthcare utilization, and treatment outcomes (34,35). The degree to which psychosocial factors contribute to or result from IBS is unclear. Nevertheless, the consistent finding that psychosocial difficulties are related to the severity of symptoms and to patient clinical status highlights the need for clinicians to also consider psychosocial factors when treating patients with IBS.

HEALTHCARE UTILIZATION

Individuals with IBS have higher rates of healthcare utilization for GI symptoms compared with patients with other digestive disorders or healthy individuals (1,36). In order to assess healthcare utilization, the National Ambulatory Medical Care Survey sampled ambulatory medical services provided by office-based physicians (~1,925–2,900 physician respondents) in the continental United States (1). Among 48.7 million digestive disease diagnoses, IBS was the most common diagnosis made by gastroenterologists and the seventh most common made across all physician specialties. Medications specifically for the GI tract were the most frequently prescribed, and medications for the treatment of IBS were prescribed at a range of 76%–79% (1). A similar pattern of results was obtained from the US householder survey, in which a self-administered questionnaire regarding GI disorders was mailed to a stratified, random sample of US households (4). Among the 5,430 respondents, individuals reporting symptoms consistent with IBS had

significantly more physician visits related to GI symptoms in the previous year compared with those individuals who did not meet criteria for a functional GI disorder (1.64 vs 0.09 mean visits; p = 0.0001).

Patients with IBS also have a tendency to report and seek medical care for non-GI symptoms more often than individuals who do not have IBS (35,37). For example, in the US householder survey, individuals who met symptom criteria for IBS were more likely than those who did not meet criteria for a functional bowel disorder to visit a physician for non-GI symptoms in the previous year (3.88 vs 1.77 mean visits; p = 0.0001) (36). In a population-based study using data from the Dutch National Survey of Morbidity and Intervention in General Practice, patients with IBS were more likely to have consulted a family physician, physical therapist, or other therapist compared with the general population (Table 2) (37). The authors noted that the high frequency of consultations with alternative therapists (more than double that of the general population) possibly reflects a failure of currently available traditional therapies to meet patients' needs. Not unexpectedly, in the Dutch study, patients with IBS (n = 56) were more likely than the general population (n = 10,787) to report bowel symptoms, including pain (43% vs 7%), constipation (42% vs 7%), stomachache (30% vs 5%), and diarrhea (21% vs 5%; p < 0.001 for each comparison) (37). Moreover, patients with IBS were also more likely to report a variety of non-GI symptoms, including tiredness (57% vs 31%), headache (55% vs 32%), anxiety (43% vs 19%), sleep disturbance (38% vs 16%), excitability (36% vs 15%), and apathy (34% vs 12%; p < 0.001 for each comparison). Finally, patients with IBS were more likely than the general population to report social problems, including difficulty with social interactions (15% vs 7%), interactions with children (14% vs 4%), loneliness (12% vs 5%), and partner relationships (11% vs 4%). These data add to a growing body of evidence indicating that patients with IBS report more psychosocial problems and nonbowel symptoms than do individuals without IBS (36,37).

WORKPLACE PRODUCTIVITY

The substantial effect of IBS on physical, social, and psychological well-being can directly impact the workplace. Several studies report that IBS increases the rate of absenteeism and impairs patients' functioning when they continue to work while experiencing symptoms. For example, in the 5,430-respondent US householder survey (4), individuals who met IBS diagnostic criteria reported missing a mean 13.4 days from work or school in the previous year compared with 4.9 days for individuals who did not meet criteria for a functional GI disorder (p = 0.001). More than one in 10 individuals (11%) who met diagnostic criteria for IBS reported that they were currently too ill to work or attend school compared with only 4% of individuals who did not meet diagnostic criteria for a functional GI disorder (4). In another survey of 287 US patients with IBS, bowel symptoms were cited as the reason for "cutting back" some days at work (46%), for losing or quitting a job (12%), and for working fewer hours (15%) (26). In a 2002 workplace survey (N = 1,776) by a large US bank, 41% of respondents to both phases of a two-phase survey met Rome II criteria for IBS (28). Employees with IBS reported a 15% greater loss in workplace productivity due to GI symptoms than employees who did not have IBS (95% confidence interval; 13.4%–16.6%). The workplace productivity loss associated with IBS equated to working less than 4 days out of a 5-day workweek.

The magnitude of impairment of workplace functioning among patients with IBS is directly related to the frequency and severity of bowel symptoms (24,25). For example, in a clinic-based study of 126 patients with IBS, diagnosed according to Rome I criteria, patients reported experiencing IBS symptoms more than 50% of the time during a 2-week period (25). Both the number of missed workdays and the percentage of effectiveness while working with IBS symptoms were directly related to patient-perceived severity of symptoms (25). Additionally, in a study of 257 patients with severe, refractory IBS, 27% were unemployed because of poor health (24). Compared with other patients with IBS (n = 187), the patients who were unemployed (n = 70) reported worse abdominal symptoms (p = 0.003) and more days with pain (p = 0.008). These findings consistently demonstrate that IBS causes absenteeism and impairs workplace functioning and that the magnitude of this impairment is directly related to severity and frequency of bowel symptoms.

DIRECT AND INDIRECT COSTS

Not surprisingly, given the impact of IBS on quality of life, healthcare utilization, and workplace productivity, the associated direct and indirect costs are substantial. The direct medical costs attributed to IBS in the United States have been estimated conservatively at $1.6–$10.5 billion per year (38–40). Indirect costs have been estimated to be as high as $20 billion per year, based on costs associated with patients who sought medical attention (38). The total cost (direct + indirect) of IBS has been estimated at $30 billion annually in the United States. This estimate is higher than the estimated cost of chronic conditions such as asthma, which is approximately $16 billion annually (41,42). These data emphasize the need to develop strategies to reduce the associated costs of IBS for employers and the healthcare system.

CONCLUSIONS

Irritable bowel syndrome is characterized by heterogeneous physiological manifestations, including visceral hypersensitivity, abnormal colonic motility, abnormal brain-gut interactions, and immune activation. Furthermore, IBS is a common condition that can substantially impair patient well-being and ability to function both at home and in the workplace. The magnitude of this impairment is directly related to the frequency and severity of bowel symptoms and is also related to psychological symptoms of IBS. Psychological evaluations and quality-of-life assessments of IBS are beneficial for quantifying these psychological and social outcomes and have contributed to the emerging biopsychosocial model of the syndrome. However, neither IBS diagnostic criteria nor current treatment guidelines consider IBS severity or biopsychosocial factors key determinants of assessment and management (43). Rather, diagnostic criteria and treatment guidelines focus on the presence or absence of specific symptoms, which constitutes an important aspect of IBS but is insufficient to account for the overall impact of IBS on the patient. Data demonstrating the clinical, humanistic, and economic burden of IBS illustrate the need to further develop a multidimensional concept of IBS to guide patient management and emphasize the need for management strategies that reduce the costs of IBS to the patient, employer, and healthcare system. ■

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