The Economic Consequences of Irritable Bowel Syndrome

A US Employer Perspective

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Background: The objective of this study was to measure the direct costs of treating irritable bowel syndrome (IBS) and the indirect costs in the workplace. This was accomplished through retrospective analysis of administrative claims data from a national Fortune 100 manufacturer, which includes all medical, pharmaceutical, and disability claims for the company’s employees, spouses/dependents, and retirees.

Methods: Patients with IBS were identified as individuals, aged 18 to 64 years, who received a primary code for IBS or a secondary code for IBS and a primary code for constipation or abdominal pain between January 1, 1996, and December 31, 1998. Of these patients with IBS, 93.7% were matched based on age, sex, employment status, and ZIP code to a control population of beneficiaries. Direct and indirect costs for patients with IBS were compared with those of matched controls.

Results: The average total cost (direct plus indirect) per patient with IBS was $4527 in 1998 compared with $3276 for a control beneficiary ($<.001). The average physician visit costs were $524 and $345 for patients with IBS and controls, respectively ($<.001). The average outpatient care costs to the employer were $1258 and $742 for patients with IBS and controls, respectively ($<.001).

Medically related work absenteeism cost the employer $901 on average per employee treated for IBS compared with $528 on average per employee without IBS ($<.001).

Conclusion: Irritable bowel syndrome is a significant financial burden on the employer that arises from an increase in direct and indirect costs compared with the control group.

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Irritable bowel syndrome (IBS) is a common chronic and episodic gastrointestinal (GI) disorder affecting between 10% and 20% of the US population at any given time. Women are more likely to experience IBS than men, at a ratio of 3:1. Although the disorder affects millions of Americans, as few as 10% to 30% of individuals with IBS report their symptoms to a physician for evaluation and treatment. As a result, the treated prevalence rate of IBS is estimated to be much lower, ranging from 1% to 6% of the population.

Irritable bowel syndrome has a significant impact on health care use and costs, which is heightened by the variability of IBS symptoms and the imprecise nature of diagnosing and treating IBS. Physicians write more than 2.2 million prescriptions annually to patients with IBS. Everhart and Renault observed that medications were prescribed at approximately 75% of physician office visits for IBS in 1991, a percentage that had remained almost constant since 1980. The total annual costs (direct and indirect) of treating IBS in the United States have been estimated to be approximately $30 billion, excluding prescription and over-the-counter drug costs.

In addition to direct costs of care, indirect costs, including reduced productivity in the workforce, are estimated to represent up to 75% of the overall economic burden of IBS. Results of the 1993 US household survey indicated that patients with IBS missed about 3 times as many days from work or school annually as people with no evidence of a functional GI disorder (mean, 13.4 vs 4.9 days; P=.001). More patients with IBS (11.3%) reported that they were often too sick to work or to attend school compared with those without IBS (4.2%). More recent survey data (1999) indicate that the actual number of missed or shortened workdays due to IBS has increased even higher since the early 1990s. These results suggested that the economic ramifications of patients with IBS are far reaching, but few
studies have quantified the impact of IBS on total worker productivity, absenteeism and decreased productivity while working (“presenteeism”), using objective measures. Burton et al12 found that digestive diseases, relative to mental health, respiratory, and musculoskeletal diseases and cancer, resulted in the highest levels of reduced productivity, and that 46% of those patients had IBS.

Because few studies have examined the direct and indirect costs associated with IBS in the same population, our objective is to estimate the burden of illness of IBS to a US employer by analyzing direct treatment and indirect workplace costs. We measured medical and pharmaceutical costs, and disability and medically related workplace absenteeism costs, associated with IBS to determine the overall economic burden of IBS on an employer.

**METHODS**

**DATA**

Administrative claims data from a national Fortune 100 manufacturing firm with more than 100,000 continuously enrolled beneficiaries, including industrial as well as service and professional employees, were used to conduct the analyses. Although this company’s workforce is predominantly male (83%), women compose 50% of the overall employer beneficiary population. The company is self-insured and funds its own health insurance and disability programs. All company employees are covered by the employer’s health insurance program, and approximately 90% of all employees are covered by its disability benefit plan. Administrative records include payments made by the employer for medical and prescription drug claims for all beneficiaries (employees, spouses, dependents, and retirees <65 years) and disability claims (for employees only). Medical and pharmacy data are from fee-for-service managed care and indemnity claims between January 1, 1996, and December 31, 1998.

**IDENTIFICATION OF BENEFICIARIES WITH IBS**

For this analysis, we sought to include patients with both IBS and a predominance of constipation. To identify beneficiaries with IBS in the administrative database, we used a combination of primary and secondary International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis codes. Beneficiaries with IBS were identified as those who, between 1996 and 1998, had at least 1 medical and/or disability claim with a primary code (primary codes include physician and discharge diagnoses) for irritable colon (ICD-9-CM code 564.1x); at least 1 medical and/or disability claim with a secondary code for irritable colon (ICD-9-CM code 564.1x), a primary code for abdominal pain (ICD-9-CM code 789.0x), and no primary code for irritable colon; or at least 1 medical and/or disability claim with a secondary code for irritable colon (ICD-9-CM code 564.1x), a primary code for constipation (ICD-9-CM code 564.0x), and no primary code for irritable colon.

Some individuals were excluded from the sample of patients with IBS based on the following criteria: individuals younger than 18 years or older than 65 years (ie, eligible for Medicare) in 1998; and individuals diagnosed as having a malignant neoplasm of the digestive organ or peritoneum (ICD-9-CM code 150.xx-159.xx), inflammatory bowel disease, Crohn disease, ulcerative colitis (ICD-9-CM code 555.xx-558.xx), or diverticulitis (ICD-9-CM code 562.01, 562.02, 562.03, 562.11, 562.12, or 562.13).

**CREATION OF THE MATCHED CONTROL SAMPLE**

Beneficiaries in the sample with IBS were matched to beneficiaries in the employer population who had no administrative claims for IBS from 1996 through 1998. A matched control sample allows estimation of the incremental costs incurred by the employer attributable to IBS. To create a matched control sample that was most comparable to the sample of beneficiaries with IBS, we matched patients treated for IBS to beneficiaries without IBS based on age ±3 years, sex, employment status, job classification (salaried vs nonsalaried and bargaining vs nonbargaining), health plan (participant in 1 of 3 fee-for-service plans offered by the employer), and ZIP code (ie, the control’s ZIP code was in the same metropolitan area and had a 1990 per capita income level within 10% of the patient’s ZIP code).

**IDENTIFICATION OF A COMORBIDITY**

To examine the prevalence of comorbidities, several conditions were identified and categorized into 2 groups (GI-related and non–GI-related comorbidities). The GI-related comorbidities included GI bleeding, gallbladder or biliary disease, liver disease, dyspepsia, peptic ulcer disease, and gastroesophageal reflux disease. The non–GI-related comorbidities included musculoskeletal or rheumatic conditions; headache, tension, or migraine; functional pain disorders; depression or anxiety; diabetes mellitus; hypertension; and thyroid disorders. Medical claims in 1998 for the sample with IBS and the matched control sample were searched for ICD-9-CM codes identifying each comorbid condition (data available from the authors).

**IDENTIFICATION OF IBS-RELATED PRESCRIPTION DRUGS**

We identified prescription drugs that are used for the treatment of IBS. These were grouped into GI-related and non–GI-related drugs. The GI-related drugs included antidiarrheal agents, bile sequestrants, laxatives, antisecretory agents, serotonin, antispasmodic agents, motility agents, and anxiolytic agents. The non–GI-related drugs included nitrates, antidepressants, pain medications, and opioid analgesics.

**DIRECT HEALTH CARE COSTS**

Direct health care costs were based on reimbursements by the employer for inpatient, hospital outpatient (eg, outpatient surgery), physician, and prescription drug services and for other ancillary services (eg, physical therapy and nursing home services).

**INDIRECT WORKPLACE COSTS**

Productivity costs for this study included sporadic work loss associated with use of medical services and extended work loss due to disability. Estimates of the cost of time lost from work for medical care were based on the type and frequency of visits to health care providers. If a medical service claim for an employee was recorded during a work weekday, then a full day of work loss was accounted for each day in the hospital and a half day was accounted for each outpatient or office visit. In addition, because the disability benefit offered by the employer covers lost work time beginning with the sixth consecutive day of a work absence, patients who claimed disability also were assigned 5 medically related work absence days before their period of disability. Indirect costs were based on payments by the employer for disability claims and imputed wages for medi-
POPULATION DESCRIPTION

Demographic Characteristics

A sample of 1610 beneficiaries, aged 18 to 64 years, treated for IBS was identified using the patient identification algorithm outlined previously, including employees, spouses, dependents, and retirees. This implies a treated prevalence of 1.1% among the employer’s beneficiaries. Of the identified patients with IBS, 1509 (93.7%) were successfully matched to beneficiaries in the control sample who had no IBS diagnoses. Among these patients with IBS, 97.5% were identified based on a primary diagnosis for IBS, 2.1% based on a secondary diagnosis for IBS and a primary diagnosis for abdominal pain, and 0.4% based on a secondary diagnosis for IBS and a primary diagnosis for constipation.

Most patients with IBS were women (Table 1). Among employees only, the percentage of women with IBS is only a third, because the employer’s workforce was predominantly male (83%). Within the sample with IBS, more than half of the patients were spouses or dependents, slightly more than a third were employees, and the remainder were retirees younger than 65 years. The average age of patients with IBS was 46 years, and the largest portion (35.5%) were between the ages of 46 and 55 years.

Prevalence of Comorbidities

Of the patient sample with IBS, 10.8% received no medical care for 1 of the selected comorbidities compared with 26.8% of the matched control sample (P<.001). Similarly, patients with IBS were more likely to have been treated for 3 or more of the selected comorbidities than

Table 1. Demographic Characteristics of the Sample With IBS and the Matched Control Sample*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Patients (n = 1509)†</th>
<th>Controls</th>
<th>Employees (n = 504)‡</th>
<th>Controls</th>
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</thead>
<tbody>
<tr>
<td>Work status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employees</td>
<td>39.6</td>
<td>39.6</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Retirees</td>
<td>3.7</td>
<td>3.7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Spouses/dependents</td>
<td>56.7</td>
<td>56.7</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*Data are given as percentage of each group unless otherwise indicated.
†These patients represent the 93.7% who were matched based on age ±3 years, sex, employment status, job classification, health plan, ZIP code, and per capita income level to a control population of beneficiaries.
‡Employees are defined as those who were employed in occupational categories and enrolled in the disability program. Approximately 90% of all employees fit this description.

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patients with IBS had a significantly higher prevalence of all the conditions selected, except for the non–GI-related conditions among patients with IBS, followed by dyspepsia. Musculoskeletal or rheumatic conditions were the most prevalent non–GI-related condition among patients with IBS, followed by gastrointestinal reflux disease (Table 2). Gastroesophageal reflux disease was the most prevalent GI-related condition among patients with IBS, followed by dyspepsia. Musculoskeletal or rheumatic conditions were the most prevalent non–GI-related conditions among patients with IBS, followed by hypertension and functional pain disorders (Table 2).

HEALTH CARE USE

Medical Services

On average, patients with IBS used more of all types of medical services than their matched controls. In 1998, patients with IBS submitted substantially more medical care claims on average compared with their matched controls (Figure 1). Physician office visits were the most frequently used type of service by patients with IBS, followed by outpatient care (eg, outpatient surgery) and other services, such as nursing or extended care, psychiatric day care, substance abuse treatment, and independent clinical laboratories.

The high average use of office and hospital outpatient services by patients with IBS may be explained by the interaction of 2 related factors. More patients with IBS used office and hospital outpatient services compared with matched controls. Almost all patients with IBS used office services compared with approximately three quarters of matched controls (Figure 2). Similarly, more patients with IBS used hospital outpatient care compared with matched controls. Among those who used office or hospital outpatient care, patients with IBS used more of each type of care on average than service users in the matched control sample (Figure 3).

Prescription Drug Use

On average, patients with IBS received more prescriptions for any type of drug than their matched controls (26.9 vs 19.2; P < .001). In particular, patients with IBS were prescribed 2.8 times more GI-related drugs (5.1 vs 1.8; P < .001) and 1.5 times more non–GI-related drugs (4.4 vs 2.9; P < .001). Across all selected drugs, 80.5% of patients with IBS were prescribed an IBS-related prescription drug compared with only 55.4% of matched controls (P < .001).

COST OF IBS

Overall, patients with IBS cost the employer significantly more per beneficiary (1.4 times) than their matched controls (Table 3). The average total cost (direct plus sources of care: direct care costs include drug costs, the cost of office visits, hospital care, and other health-related services; outpatient care was the most frequently used type of care by patients with IBS, followed by hospital care, substance abuse treatment, and independent clinical laboratories. All differences between groups were significant. Asterisk indicates P < .001; dagger, P < .01; and double dagger, P < .05.

Table 2. Treated Prevalence of Selected Comorbidities for All Beneficiaries in 1998*

<table>
<thead>
<tr>
<th>Type of Comorbidity</th>
<th>Patients With IBS (n = 1509)</th>
<th>Controls (n = 1509)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GI Related</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GERD or heartburn</td>
<td>769 (51.0)†</td>
<td>485 (32.1)</td>
</tr>
<tr>
<td>Dyspepsia</td>
<td>418 (27.7)†</td>
<td>166 (11.0)</td>
</tr>
<tr>
<td>Gallbladder or biliary disease</td>
<td>153 (10.1)†</td>
<td>71 (4.7)</td>
</tr>
<tr>
<td>GI bleeding</td>
<td>128 (8.5)†</td>
<td>46 (3.0)</td>
</tr>
<tr>
<td>Peptic ulcer disease</td>
<td>107 (7.1)†</td>
<td>48 (3.2)</td>
</tr>
<tr>
<td>Liver disease</td>
<td>84 (5.6)†</td>
<td>71 (4.7)</td>
</tr>
<tr>
<td><strong>Not GI Related</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Musculoskeletal or rheumatic conditions</td>
<td>618 (41.0)†</td>
<td>441 (29.2)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>424 (28.1)†</td>
<td>334 (22.1)</td>
</tr>
<tr>
<td>Functional pain disorders</td>
<td>367 (24.3)†</td>
<td>221 (14.6)</td>
</tr>
<tr>
<td>Headache, tension or migraine</td>
<td>289 (19.2)†</td>
<td>177 (11.7)</td>
</tr>
<tr>
<td>Depression or anxiety</td>
<td>274 (18.2)†</td>
<td>154 (10.2)</td>
</tr>
<tr>
<td>Malaise and fatigue</td>
<td>246 (16.3)†</td>
<td>172 (11.4)</td>
</tr>
<tr>
<td>Thyroid disorder</td>
<td>207 (13.7)†</td>
<td>142 (9.4)</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>131 (8.7)†</td>
<td>129 (8.5)</td>
</tr>
<tr>
<td>Fibromyalgia</td>
<td>129 (8.5)†</td>
<td>81 (5.4)</td>
</tr>
<tr>
<td>Rheumatoid arthritis</td>
<td>26 (1.7)†</td>
<td>17 (1.1)</td>
</tr>
</tbody>
</table>

Abbreviations: GERD, gastroesophageal reflux disease; GI, gastrointestinal; IBS, irritable bowel syndrome. *Data are given as number (percentage) in each group. †P < .001 vs the matched controls.

Figure 1. Medical care use based on claims per patient for patients treated for irritable bowel syndrome and the control sample in 1998. “Other” includes care at a patient’s home, a nursing or extended-care facility, a psychiatric day care facility, a substance abuse treatment facility, and independent clinical laboratories, significant at P < .01. Differences between groups for the office, outpatient, other, and total categories were significant (P < .001).

Figure 2. Medical care use in patients with multiple claims for those treated for irritable bowel syndrome and the control sample in 1998. “Other” includes care at a patient’s home, a nursing or extended-care facility, a psychiatric day care facility, a substance abuse treatment facility, and independent clinical laboratories. All differences between groups were significant. Asterisk indicates P < .001; dagger, P < .01; and double dagger, P < .05.

Figure 3. Costs of IBS.
were identified based on a primary diagnosis for IBS. It was estimated that IBS results in 2.4 to 3.5 million physician visits yearly.18

Outpatient care costs to the employer were significantly higher for patients with IBS than for matched control beneficiaries, as were the costs of physician office visits. Overall, we also found that patients with IBS, 33% of the employer’s payments for medical services were for the treatment of IBS (4%) and selected comorbidities (29%) compared with 23% for matched controls (P<.001). Pharmacy costs were $1060 and $723 for patients with IBS and controls, respectively (P<.001).

Similar findings were obtained for the subsamples of employees only (Table 3). Employees with IBS cost the employer 1.5 times more on average than employees in the matched control sample ($6364 vs $4245; P<.001). Absenteeism costs associated with the sample with IBS were significantly higher than those of their matched controls. However, average disability costs per employee were not statistically different for patients with IBS and their matched controls ($1460 vs $1371; P=.72). This is consistent with the fact that IBS was not a reason for disability in 1998. In addition, we found that the selected comorbidities did not induce a higher rate of disability among patients with IBS than their matched controls (6.5% of patients with IBS took disability because of 1 of the selected comorbidities vs 6.6% of matched controls).

Our findings suggest that IBS poses a significant burden on employers. We determined that 1.1% of the employer’s beneficiaries had been treated for IBS based on administrative claims. A patient with IBS cost the employer $1251 more on average compared with a matched control. Costs for patients with IBS were particularly high compared with matched controls for ambulatory care, prescription drugs, and work absenteeism. The higher costs in these areas for patients with IBS are linked to higher medical care use among these patients compared with their matched controls. Meanwhile, we found that disability costs are not significantly higher among employed patients with IBS than their matched controls.

Supporting the generalizability of these findings, the prevalence rate found in this analysis is consistent with the treated prevalence rate of IBS in the United States, which has been estimated to be between 1% and 6%.1,3 Moreover, despite the fact that 83% of this company’s workforce was male, most patients with IBS in this analysis were women (68.3%), which is consistent with a report by the American College of Gastroenterology7 that states that women are more likely to experience IBS than men, by a ratio of 3:1.

Although the identification method used for patients with IBS in this study was designed to include patients with both IBS and a predominance of constipation, almost all (97.5%) of the patients with IBS studied were identified based on a primary diagnosis for IBS. It is, indeed, the case that a true patient sample with IBS was identified for this study. However, the estimated costs of these patients with IBS may yet underestimate the overall cost burden of IBS, because the patient identification method used did not target those diagnosed as having functional diarrhea or abdominal pain and diarrhea. It is possible that patients diagnosed as having functional diarrhea and not IBS may, in fact, actually have IBS. Yet, the costs of these patients are not included in this study.

Investigating the prevalence of GI- and non–GI-related comorbidities, we found that although depression and anxiety are commonly associated with IBS in the literature,15-17 these conditions were only the fifth most prevalent selected non–GI-related condition among patients with IBS, following such less commonly associated conditions as hypertension. Our finding that all the GI-related comorbidities were more prevalent among patients with IBS than their matched controls was less surprising. In addition, because IBS is a symptom-driven diagnosis and the symptoms may arise from many GI-related conditions, it is difficult to determine the causal nature or correlation between comorbidities and IBS. Thus, to prevent introducing bias into the economic analysis, we present the prevalence rates of comorbidities rather than control for them in the analysis.

Although IBS did not result in high levels of disability or substantial use of inpatient care, which employers commonly associate with high costs, IBS imposed significant incremental costs on the employer in our study. These costs were attributed to greater use of office and hospital outpatient care with the attendant increase in work absenteeism and greater use of prescription medications. These findings are consistent with the National Ambulatory Medical Care Survey and National Disease and Therapeutic Index data, which show that IBS results in 2.4 to 3.5 million physician visits yearly.18

Our study reveals that, in 1998, incremental costs to the employer for a beneficiary with IBS were $1251 (P<.001) and that incremental costs to the employer for an employee with IBS were $2119 (P<.001). We estimate that this employer paid $1.9 million in additional direct medical and indirect workplace costs in 1998 for
beneficiaries treated for IBS. Using the consumer price index for all goods (because costs include medical and work loss components), in 2001, the same population with IBS would cost the employer an additional $2.1 million. Also, because the additional costs associated with IBS were linked to sporadic medically related absences (office and outpatient care) in addition to prescription drug use, at least some of the added cost was in areas that are not monitored as closely by employers, such as inpatient care costs. Thus, much of the incremental costs associated with IBS may go unnoticed by employers.

Although IBS is often characterized as an illness that primarily affects women, the preponderance of men in the employee portion of the sample with IBS underscores that even employers with a predominantly male workforce are impacted by the economics of IBS. As employers increasingly bear the burden of paying for health care, managing the efficient use of health care resources and the quality of care has become increasingly relevant. Several potential strategies may assist employers in addressing the incremental costs associated with IBS. Because the primary cost drivers in the IBS group were ambulatory and prescription drug care, an employer may consider investment in an evidence-based systematic approach for the identification and management of IBS. As our study and others have shown, patients with IBS used more ambulatory care services and more of GI- and non–GI-related prescription drugs. Therefore, it is possible that an investment in managing IBS may result in a positive return on investment to the employer.

There were several limitations to this analysis. The analysis was limited to the use of administrative claims data and, thus, subject to the usual limitations of such data (eg, absence of clinical detail and validation of its accuracy). Although the use of administrative claims data from an employer allowed us to assess the direct and indirect workplace costs associated with IBS, it limited our analysis to those persons with IBS who have received treatment for their illness. Based on the literature, most patients with IBS (70%-90%) do not receive treatment for their condition. The costs associated with these untreated patients with IBS are not included in this study.

In addition, a comprehensive analysis of productivity would include an investigation of work absenteeism to care for a dependent with IBS (caregiver burden) and work presenteeism due to medically related reductions in work performance while on the job. Also, there is evidence that IBS negatively affects sleep, sexual function, leisure, travel, and diet, all factors that may result in lost productivity while at work and increases in direct medical costs. The administrative claims database used for this study did not contain information that could be used to estimate productivity losses while on the job, time off for illnesses during which the individual stayed home but did not seek medical care, or a valuation of other nonworkplace burdens associated with IBS. A complete analysis and valuation of all indirect costs associated with IBS would need to consider these nonworkplace burdens as well. All of these limitations result in the likely underestimation of indirect costs attributable to IBS.

Finally, although most (68.3%) of the patients identified as treated for IBS in this employer’s claims data were female, consistent with the prevalence of IBS among women in the overall population, the employer whose data were analyzed in this article employed a predominantly male workforce. Therefore, the employed sample with IBS that we analyzed contained an artificially low percentage of women (36.1%). In addition, most of the sample with IBS was composed of spouses and dependents. Although these factors did not affect the calculation of the average annual per beneficiary cost of IBS to this specific employer, it could result in an underestimation of the indirect workplace costs of IBS to society.

Table 3. Employer Payment Costs by Cost Component for All Beneficiaries and for Employees Only in 1998

<table>
<thead>
<tr>
<th>Type of Cost</th>
<th>Cost, $</th>
<th>% of the Total</th>
<th>Cost, $</th>
<th>% of the Total</th>
<th>Cost, $</th>
<th>% of the Total</th>
<th>Cost, $</th>
<th>% of the Total</th>
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<tbody>
<tr>
<td>Direct</td>
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<td></td>
</tr>
<tr>
<td>Medical</td>
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<td></td>
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<td></td>
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<td></td>
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<tr>
<td>Hospital outpatient</td>
<td>1258*</td>
<td>28</td>
<td>742</td>
<td>23</td>
<td>1276*</td>
<td>20</td>
<td>666</td>
<td>16</td>
</tr>
<tr>
<td>Hospital inpatient</td>
<td>812</td>
<td>18</td>
<td>780</td>
<td>24</td>
<td>980</td>
<td>15</td>
<td>582</td>
<td>14</td>
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<tr>
<td>Physician’s office</td>
<td>524*</td>
<td>12</td>
<td>345</td>
<td>11</td>
<td>566*</td>
<td>9</td>
<td>361</td>
<td>8</td>
</tr>
<tr>
<td>Other†</td>
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<td>2</td>
<td>52</td>
<td>2</td>
<td>134†</td>
<td>2</td>
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<tr>
<td>Pharmacy</td>
<td>1060*</td>
<td>23</td>
<td>723</td>
<td>22</td>
<td>1042*</td>
<td>16</td>
<td>680</td>
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<tr>
<td>Subtotal</td>
<td>3736*</td>
<td>83</td>
<td>2642</td>
<td>81</td>
<td>3997*</td>
<td>63</td>
<td>2346</td>
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<td>Disability</td>
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<td>14</td>
<td>1466</td>
<td>23</td>
<td>1371</td>
<td>32</td>
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<tr>
<td>Absenteeism</td>
<td>301*</td>
<td>7</td>
<td>176</td>
<td>5</td>
<td>901*</td>
<td>14</td>
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<td>12</td>
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<tr>
<td>Subtotal</td>
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<td>37</td>
<td>1899</td>
<td>45</td>
</tr>
<tr>
<td>Total</td>
<td>4527*</td>
<td>100</td>
<td>3276</td>
<td>100</td>
<td>6364*</td>
<td>100</td>
<td>4245</td>
<td>100</td>
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</table>

Abbreviation: IBS, irritable bowel syndrome.

*P<.001 vs the matched controls.
†Includes the cost of laboratory services, durable medical equipment, care at a patient’s home, nursing or extended care, psychiatric day care, and substance abuse treatment.
‡P<.05 vs the matched controls.
overall. The Bureau of Labor Statistics reports that, in 1998, 58% of women older than 20 years were employed. Therefore, about 58% of the female spouses and dependents older than 20 years that we identified in the employer data were most likely employed elsewhere and, thus, generating indirect costs for other employers.

Although our study determined that the direct costs associated with IBS are significant, there has been little rigorous research on indirect costs and the impact on worker productivity attributable to IBS. Future research should continue to focus on refining the understanding and valuation of direct and indirect costs associated with IBS. In addition, future studies should address the economic burden associated with those who have IBS but remain untreated. These individuals may incur greater indirect costs and perhaps even greater direct costs associated with the treatment of other conditions. Finally, rigorous studies of evidence-based interventions to improve the care of employees and beneficiaries with IBS should be performed to demonstrate that the direct and indirect costs of IBS to an employer may be meaningfully impacted.

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