

Annual Direct and Indirect Cost of Illness in Employees with Irritable Bowel Syndrome plus Constipation

Richard A. Brook, MS^{1*}, Nathan L. Kleinman, PhD², Arthur K. Melkonian, MD² and Robert W. Baran, PharmD³

¹Retrospective Analysis, The JeSTARx Group, Newfoundland, NJ; ²Analysis & Research Services, HCMS, Cheyenne, WY; and ³Health Economics & Outcomes Research, Takeda Global Research & Development Center, Inc., Deerfield, IL.

Introduction

- Irritable bowel syndrome (IBS) plus constipation (IBS+C) can negatively impact the function of employed patients, which potentially incurs a financial burden to employers.
- This financial burden is a major component of the cost (burden) of illness for IBS+C.
- Employers provide more than just salary to their employees.¹ Some employer contributions are health-related including the following:
 - Healthcare and prescription drug coverage
 - Sick leave and short-term disability salary replacement while employees are absent due to illness
- Consequently, a wide array of health-related outcomes must be quantified to assess the cost impact of IBS+C from an employer's perspective.
- Previous cost of illness studies for IBS have not differentiated between IBS with Constipation and IBS with Diarrhea.
- No recent, published studies have reported on absenteeism costs or lost time due to IBS+C.

Aim

- To examine the impact of IBS+C in an employed population.

Methods

- A retrospective analysis was performed on data (2001 to 2005) from the Human Capital Management Services (HCMS) Research Reference Database consisting of approximately 510,000 employees representing the retail, service, manufacturing, and financial industries.
- Anonymity of person-level data was maintained according to the Health Insurance Portability and Accountability Act guidelines.
- International Classification of Diseases-9* (ICD-9) codes were used to identify employees with primary, secondary, or tertiary diagnoses.
- IBS+C was defined by a surrogate as persons with IBS (ICD-9 code 564.1) co-occurring with one of the following Constipation diagnoses:
 - 564.0 Constipation
 - 564.00 Constipation, unspecified
 - 564.01 Slow transit constipation
 - 564.09 Other constipation
- The control group was comprised of employees with no IBS or constipation-related diagnoses.
- The index date for each employee with IBS+C was 3 months prior to the first date of service associated with IBS, as noted by ICD-9 code in the claims record. For controls, the index date was the average index date of subjects with IBS+C.
- For the purposes of the analysis, subjects from the IBS+C and control groups needed to be continuously employed and eligible for health benefits for at least 1 year after their index date.
- Outcome measures included direct costs (medical and prescription) as well as indirect costs associated with payments for absences (sick leave and short-term disability) in the time period after the index date.

Statistical Analysis

- Two-stage regression analysis was used to model the cost differences between the IBS+C and control cohorts using separate regression models for direct medical costs, prescription drug costs, absence (indirect) costs and absence days.
 - Logistic regression was used to model the probability of having any cost or absence (stage 1).
 - Generalized linear models with gamma distributions and log link functions were used to model costs and absence days among employees with costs or absences (stage 2).
- The models for costs and days controlled for population differences in age, sex, marital status, race, exempt/non-exempt status (exempt employees are not paid on an hourly basis and are not paid for overtime work), full-time/part-time status, salary, Charlson Comorbidity Index² and region (defined by the first digit of the employee's postal zip code).
- Only employees eligible for each specific benefit were included in the regression models for that benefit. Lost days included all days from claims begun at some point during the year following the index date.

Results

- Data were available for 296,154 eligible employees of which 243 were identified with IBS+C. The employees with IBS+C were more frequently ($P<0.05$) female (80.2% vs. 42.0%), not married (51.8% vs. 43.8%), and employed full time (95.5% vs. 88.6%, **Table 1**).
- Comparisons of annual direct and indirect costs showed all differences between employees with and without IBS+C to be significant ($P<0.05$, **Table 2**). IBS+C was associated with annual mean incremental direct costs of USD \$3,590 per employee (80% medical; 20% prescription drug), and indirect costs (sick leave; short-term disability) of \$702.
- Of the \$4,292 incremental costs, direct medical costs accounted for 66.8%, prescription drug costs for 16.9%, sick leave costs 7.3% and short-term disability costs 9.1% (**Figure 1**).
- Overall, IBS+C was associated with an annual mean absence of 9.84 days per employee compared with 5.09 days for the control group (**Table 3**). Short-term disability was responsible for 60.2% of the incremental absences (2.86 days, $P=0.0691$) but was not significant. Sick leave absences accounted for 39.8% of the incremental absence days and was highly significant ($P<0.0001$).

Table 1. Descriptive Statistics for Employees with and without IBS+C

Variable	Employees with IBS+C		Controls (Employees without IBS+C)		Comparison	
	N	Mean (S.E.), % or \$	N	Mean (S.E.), % or \$	Difference Between Cohorts	P-Value ¹
Age (at index date)	243	41.03 (0.69)	295,893	40.37 (0.02)	-0.66	0.3032
Tenure (at index date)	243	8.59 (0.52)	295,911	9.36 (0.02)	0.77	0.1473
Female	243	80.2%	295,911	42.0%	-38.3%	<0.0001
Married	224	48.2%	270,874	56.2%	8.0%	0.0162
White	185	63.2%	220,579	61.2%	-2.0%	0.5740
Black	185	14.1%	220,579	17.2%	3.1%	0.2608
Hispanic	185	10.8%	220,579	9.8%	-1.1%	0.6289
Exempt	243	33.7%	295,903	28.7%	-5.1%	0.0813
Full Time	243	95.5%	295,911	88.6%	-6.9%	<0.0001
Annual Salary	243	\$50,354 (\$1,825)	292,438	\$50,264 (\$339)	-\$89	0.9616
Zipcode, 1 st digit						
= 0	243	15.6%	295,911	11.7%	-4.0%	0.0891
= 1	243	7.8%	295,911	13.1%	5.3%	0.0025
= 2	243	16.0%	295,911	12.8%	-3.3%	0.1666
= 3	243	15.6%	295,911	19.7%	4.1%	0.1117
= 4	243	2.5%	295,911	5.3%	2.8%	0.0052
= 5	243	0.4%	295,911	1.3%	0.8%	0.0412
= 6	243	5.8%	295,911	3.4%	-2.4%	0.1097
= 7	243	18.5%	295,911	15.7%	-2.8%	0.2304
= 8	243	7.0%	295,911	5.1%	-1.8%	0.2615
= 9	243	10.7%	295,911	12.0%	1.3%	0.5424

S.E. Standard Error ¹P-values calculated using *t* tests for continuous variables and chi-square (χ^2) tests for discrete variables

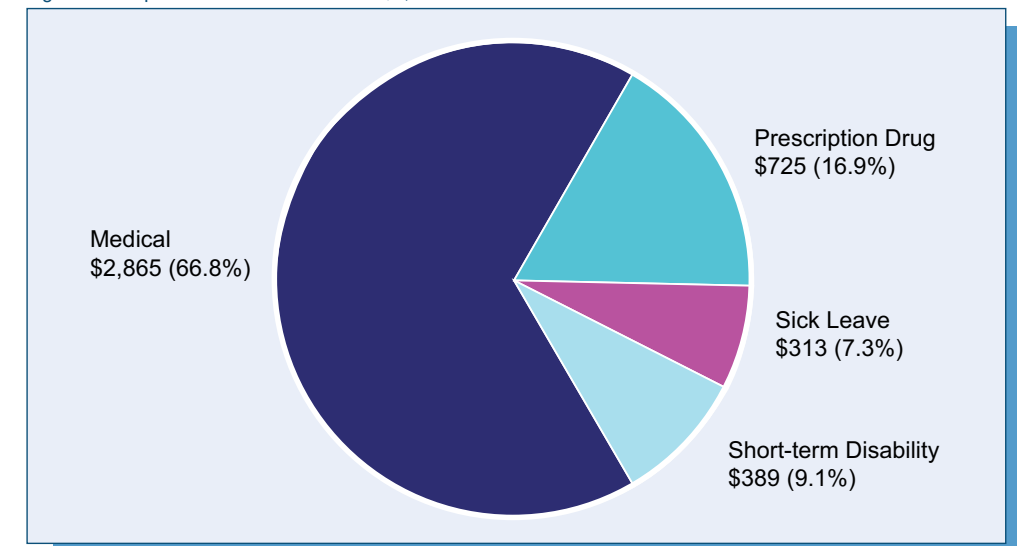
Table 2. Cost of Illness of IBS+C to the Employer

Cost Category	IBS+C		Controls		Difference	
	N	Adjusted Mean Annual Costs (\$)	N	Adjusted Mean Annual Costs (\$)	In Adjusted Mean Annual Costs (\$)	P-Value
Direct:						
Medical	243	\$4,623	295,911	\$1,758	\$2,865	<0.0001
Prescription Drug	243	\$1,190	295,911	\$465	\$725	<0.0001
Total Direct		\$5,813		\$2,223	\$3,590	
Indirect:						
Sick Leave	108	\$669	143,287	\$355	\$313	<0.0001
Short-term Disability	140	\$677	149,066	\$288	\$389	0.0417
Total Indirect		\$1,346		\$643	\$702	
Total Direct and Indirect		\$7,159		\$2,866	\$4,292	

Table 3. Absence Days Associated with IBS+C

Absence Category	IBS+C		Controls		Difference	
	N	Adjusted Mean Annual Absence Days	N	Adjusted Mean Annual Absence Days	In Adjusted Mean Annual Absence Days	P-Value
Sick Leave	108	4.20	143,287	2.31	1.89	<0.0001
Short-term Disability	140	5.64	149,066	2.78	2.86	0.0691
Total Absences		9.84		5.09	4.75	

Figure 1. Component Contributions to the \$4,292 Incremental Direct and Indirect Costs of IBS+C



Conclusions

- IBS+C is associated with substantial cost (burden) of illness which can be a large financial liability to employers.
- Direct medical costs (excluding prescription medications) significantly contributed to 66.8% of total incremental costs in this analysis.
- Indirect costs (sick leave and short-term disability) also significantly contributed to total incremental costs.
- These results indicate an opportunity for improved management of patients with IBS+C that may result in reduced costs from an employer perspective.

References

- Butler RJ. The economics of social insurance and employee benefits. Norwell, MA: Kluwer Academic Publishers, 1999.
- Charlson ME, et al. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. *J Chronic Dis* 1987; 40: 373-83.

Supported by Takeda Pharmaceutical Company, Ltd.
Presented at The American College of Gastroenterology 2008 Scientific Meeting

Annual Direct and Indirect Cost of Illness in Employees with Irritable Bowel Syndrome plus Constipation

Richard A. Brook, MS^{1*}, Nathan L. Kleinman, PhD², Arthur K. Melkonian, MD² and Robert W. Baran, PharmD³

¹Retrospective Analysis, The JeSTARx Group, Newfoundland, NJ;

²Analysis & Research Services, HCMS, Cheyenne, WY; and

³Health Economics & Outcomes Research, Takeda Global Research & Development Center, Inc., Deerfield, IL

Abstract

Purpose:

To assess the annual direct and indirect cost of illness for irritable bowel syndrome plus constipation (IBS+C) among US-based employees.

Methods:

A retrospective analysis was conducted using the Human Capital Management Services Research database, which contains employee data from 2001-2005 sourced from multiple US-based employers. Data fields included medical, pharmacy, payroll, work absence (where available), and demographics. The IBS+ C cohort consisted of employees identified with ICD-9 Codes 564.0 (Constipation), 564.00 (Unspecified), 564.01 (Slow Transit), or 564.09 (Other) co-occurring with 564.1x (IBS) in the same year. Employees with no claims for these codes comprised the Control cohort. The annual measurement period for each IBS+C subject began 3 months prior to the first date of service associated with IBS or C. For controls, the index date was the average index date of subjects with IBS+C. Two-part regression modeling was used to determine the annual cost differences between IBS+C and Control cohorts while controlling for age, job tenure, gender, salary, region, and Charlson Comorbidity Index score. Direct (inpatient and outpatient visits, prescription drug) and indirect (sick leave, and short-term disability [STD]) costs were analyzed.

Results:

Data were available for 296,154 employees. IBS+C employees compared to Controls were more frequently ($P<0.05$) female (80.2% vs. 42.0%), not married (51.8% vs. 43.8%), and employed full time (95.5% vs. 88.6%). All annual cost outcomes comparisons (Table 1) were statistically greater in the IBS+C cohort ($P<0.05$). IBS+C was associated with an annual mean incremental direct cost versus controls totaling \$3,590; medical costs accounted for 80% of the direct cost difference and prescription drug costs 20%. IBS+C was also associated with \$702 incremental indirect costs. IBS+C contributed 1.89 incremental sick leave days ($P<0.05$) but differences in STD days were not significant.

Category	IBS+C		Controls		Difference	
	N	Adjusted Mean	N	Adjusted Mean	In Means	P-Value
Direct						
Medical (\$)	243	\$4,623	295,911	\$1,758	\$2,865	<0.0001
Prescription Drug (\$)	243	\$1,190	295,911	\$465	\$725	<0.0001
Indirect:						
Sick Leave (\$)	108	\$669	143,287	\$355	\$313	<0.0001
Short-term Disability (\$)	140	\$677	149,066	\$288	\$389	0.0417
Sick Leave (Days)	108	4.20	143,287	2.31	1.89	<0.0001
Short-term Disability (Days)	140	5.64	149,066	2.78	2.86	0.0691

Conclusion:

IBS+C is associated with significant cost and absenteeism; in this study, the majority of total incremental costs were direct medical.