

# Cost of Illness for Constipation: Medical, Pharmacy, and Work Absence Costs in Employees With or Without Constipation

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## ABSTRACT

**Purpose:** To assess the Annual Cost of Illness for constipation (C) among US-based employees. **Methods:** A retrospective analysis was conducted using the Human Capital Management Services Research database, which represents multiple US-based employers and contains employee data from 2001-2005. Data fields included medical, pharmacy, payroll, work absence (where available), and demographics. ICD-9 Codes 564.0 (Constipation), 564.00 (Unspecified), 564.01 (Slow Transit), and 564.09 (Other) distinguished employees with C from employees with no claims for these codes (NC). Two-part regression modeling was used to determine the annual cost differences between C and NC employees while controlling for age, job tenure, sex, salary, region, and Charlson Comorbidity Index score. Direct medical (inpatient and outpatient visits), prescription drug, and work absence claims costs were analyzed. **Results:** Data were available for 298,006 employees. C employees compared with NC controls were on average 42.7 vs. 40.1 years of age, 63.0% vs 42.0% Female, and 19.8% vs 17.2% Black, respectively (all  $P < 0.0001$ ). All annual cost of illness comparisons (Table 1) were statistically different ( $P < 0.03$ ), except for costs of workers' compensation. C was associated with an annual mean incremental cost versus controls totaling \$3,545; direct medical costs accounted for 76.5%, prescription drug costs for 11.6%, and work absence costs (sick leave, short- and long-term disability, and workers' compensation, where absentee data were available) for 11.9%. **Conclusion:** Constipation is associated with substantial costs; in this study, direct medical costs contributed the majority of total incremental costs.

Table 1	Cost of Illness				
	Constipation		No Constipation		P-Value
Cost Category	N	Adjusted Mean Cost (\$)	N	Adjusted Mean Cost (\$)	
Direct Medical	2,095	4,472	295,911	1,758	2,714 <0.0001
Prescription Drug	2,095	874	295,911	465	410 <0.0001
Sick Leave	920	475	143,287	355	120 <0.0001
Short-term Disability	1,074	465	149,066	288	178 0.0005
Long-term Disability	1,710	78	224,745	19	60 0.0299
Workers' Compensation	1,907	790	272,024	726	64 0.3803
Total		7,155		3,610	3,545

## INTRODUCTION

- Constipation can have a negative impact on 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 constipation.
- In addition to salary, employers contribute:<sup>1</sup>
  - Healthcare and prescription drug coverage
  - Sick leave, short- and long-term disability salary replacement while employees are absent due to illness
  - Workers' compensation medical coverage and salary replacement.
- Consequently, a wide array of health-related outcomes must be quantified to assess the cost impact of constipation from an employer's perspective.
- Previous cost of illness studies for constipation have frequently included other conditions, such as IBS.
- Few studies have focused on direct medical and prescription drug costs of constipation.
- No recently published studies have reported on total absenteeism costs or lost time due to constipation.

## Objectives

- To examine the impact of constipation on employees, quantifying the annual cost of illness to the employer by examining:
  - Annual health benefit costs per employee for medical and prescription drug claims (direct costs)
  - Sick leave, short- and long-term disability, and workers' compensation claims (indirect costs)
  - Lost time associated with absenteeism.
- To project the study findings to a US national perspective.

## 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 a primary, secondary, or tertiary diagnosis:
    - 564.0 Constipation
    - 564.00 Constipation, unspecified
    - 564.01 Slow transit constipation
    - 564.09 Other constipation.
  - Non-constipation employees (no record of constipation-related diagnoses) were defined as the control group.
  - The index date for each employee with constipation was 3 months prior to the first date of service associated with the disease, as noted by the ICD-9 code in the claims record. For controls, the index date was the average index date of subjects with constipation.
  - For the purposes of the analysis, subjects from the constipation 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 medical and prescription costs, as well as payments for absences (sick leave, short- and long-term disability, and workers' compensation).
  - For projection purposes representative of public health concerns, the study findings were applied to both estimates of the US civilian labor force<sup>2</sup> and the US population insured by employers.<sup>3</sup>
  - Difference is significant at  $P \leq 0.05$ .
- ### Statistical Analysis
- Two-stage regression analysis was used to model the cost differences between the constipation and non-constipation cohorts using separate regression models for:
    - Direct medical costs
    - Prescription drug costs
    - Absence (indirect) costs
    - Absence days.
  - The models controlled for population differences in age, tenure (years with current employer), sex, marital status, race, exempt/nonexempt 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 Index score,<sup>4</sup> and region (defined by the first digit of the employee's postal zip code).
  - Absence days were adjusted using regression modelling and controlled for age, sex, marital status, race, exempt status, full-time/part-time status, salary, location, and Charlson Comorbidity Index score. Only employees eligible for each specific benefit were included in the regression models for that benefit. Lost days include all days from claims initiated at some point during the year following the index date.

## RESULTS

- Data were available for 229,906 eligible employees of which 2,095 had constipation ICD-9 codes associated with claims. The employees with constipation had a mean age of 42.7 years, were predominantly female (63%), and were predominantly full-time workers (92.6%) (Table 1).

Table 1. Descriptive Statistics for Employees With and Without Constipation

Variable	Constipation			No Constipation			Comparison	
	N	Mean	Standard Error	N	Mean	Standard Error	Difference in Means	P-value for Difference
Age (at index date*)	2,095	42.70	0.24	295,893	40.37	0.02	-2.33	<0.0001
Tenure (at index date <sup>1</sup> )	2,095	9.20	0.19	295,911	9.36	0.02	0.16	0.3925
Female	2,095	63.0%	1.1%	295,911	42.0%	0.1%	-21.0%	<0.0001
Married	1,907	51.8%	1.1%	270,874	56.2%	0.1%	4.4%	0.0001
White	1,603	53.4%	1.2%	220,579	61.2%	0.1%	7.8%	<0.0001
Black	1,603	19.8%	1.0%	220,579	17.2%	0.1%	-2.6%	0.0092
Hispanic	1,603	10.8%	0.8%	220,579	9.8%	0.1%	-1.0%	0.1830
Exempt	2,095	29.2%	1.0%	295,903	28.7%	0.1%	-0.5%	0.6284
Full Time	2,095	92.6%	0.6%	295,911	88.6%	0.1%	-4.1%	<0.0001
Annual Salary	2,084	\$47,119	\$583	292,438	\$50,264	\$339	\$3,145	<0.0001

\*For employees with constipation, the index date is 3 months prior to the date of the first constipation diagnosis in the study period. For employees without constipation, the index date is the average index date based on the group of employees with constipation.

- Comparison of annual health benefit costs showed significant differences between employees with and without constipation (Table 2). Direct medical costs and prescription drug costs were significant cost drivers. Indirect costs, including sick leave, short- and long-term disability, were also significant cost drivers (workers' compensation not significant).

Table 2. Cost of Illness of Constipation to the Employer

Cost Category	Constipation		No Constipation		Comparison	
	N	Adjusted Mean Cost	N	Adjusted Mean Cost	Difference	P-value for Difference
Healthcare	2,095	\$4,472	295,911	\$1,758	\$2,714	<0.0001
Prescription Drug	2,095	\$874	295,911	\$465	\$410	<0.0001
Sick Leave	920	\$475	143,287	\$355	\$120	<0.0001
Short-term Disability	1,074	\$465	149,066	\$288	\$178	0.0005
Long-term Disability	1,710	\$78	224,745	\$19	\$60	0.0299
Workers' Compensation*	1,907	\$790	272,024	\$726	\$64	0.3803
Totals		\$7,155		\$3,610	\$3,545	N/A <sup>1</sup>
Incremental					\$3,545	N/A <sup>1</sup>

\*Category included medical costs plus salary replacement costs.  
<sup>1</sup>N/A=not applicable

- Constipation was associated with an annual mean incremental cost of USD \$3,545 per employee, of which direct medical costs accounted for 76%, prescription drug costs for 12%, and indirect costs (sick leave, short- and long-term disability, and workers' compensation) for 12% (Figure 1).
- Overall, constipation was associated with an annual mean absence of 12.84 days per employee compared with 7.78 days for the control group (Table 3). The largest incremental absence driver was long-term disability (3.14 days,  $P = 0.0325$ ), which contributed 57% of the incremental difference (Figure 2).

Figure 1. Incremental Health Benefit Cost Contribution of Constipation

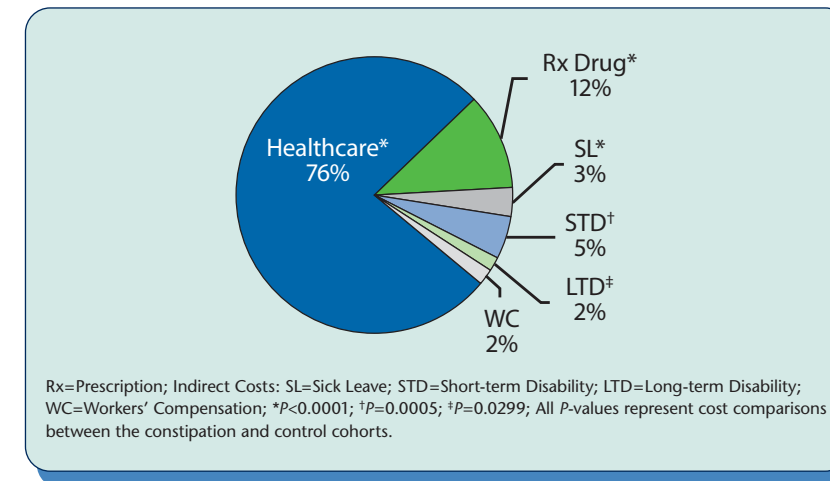
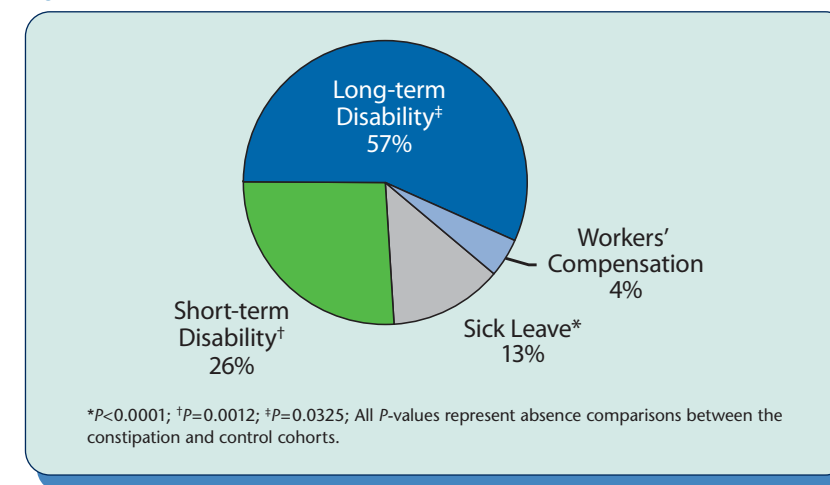


Table 3. Absenteeism in Persons With and Without Constipation

Cost Category	Constipation		No Constipation		Comparison	
	N	Adjusted Mean Days	N	Adjusted Mean Days	Difference	P-value for Difference
Sick Leave	920	3.02	143,287	2.31	0.71	<0.0001
Short-term Disability	1,074	4.24	149,066	2.78	1.46	0.0012
Long-term Disability	1,710	4.28	224,745	1.14	3.14	0.0325
Workers' Compensation	1,907	1.30	272,024	1.55	-0.25	0.2473
Totals		12.84		7.78	5.06	N/A*

\*N/A=not applicable

Figure 2. Incremental Absence Contribution



- Projecting the study findings (Table 4), constipation is associated with:
  - Total incremental health benefit costs of \$3.611 billion (\$3.182 billion direct plus \$0.429 billion indirect), with 5.156 million lost days for the US civilian labor force
  - Total incremental health benefit costs of \$2.863 billion (\$2.523 billion direct plus \$0.341 billion indirect) with 4.089 million lost days for the population insured by their employers.

Table 4. Projections of the Impact of Constipation to the US Civilian and Employer-insured Labor Forces

Projections	US Civilian Labor Force (2002)	Population Insured by Employer (2002)
Persons (millions of persons)	144.900	114.900
<b>Estimated:</b>		
Prevalence of Constipation* (millions of persons)	1.019	0.808
Incremental Annual Direct Healthcare Costs (medical+Rx) (\$ billions)	\$3.182	\$2.523
Incremental Annual Indirect Costs (SL, STD, LTD, WC) (\$ millions)	\$429.554	\$340.619
Total Incremental Annual Costs (\$ billions)	\$3.611	\$2.863
Incremental Absence Days (millions)	5.156	4.089
Incremental Absence Years (thousands)	14.127359	11.20244

\*This study's prevalence rate of 0.703% was used for projections.

## SUMMARY AND CONCLUSIONS

- Constipation is associated with substantial cost (burden) of illness, which can be a large financial liability to employers.
- Direct healthcare costs (excluding prescription medications) significantly contributed to 76% of total incremental costs in this study.
- Indirect costs (sick leave, short- and long-term disability) also significantly contributed to total incremental costs.
- Constipation is underreported in healthcare databases due to ICD-9 coding; therefore, projections to the population are conservative.
- These results indicate an opportunity for improved management of patients with constipation, which may result in reduced costs from a societal perspective.

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