DIRECT COST SIMILARITIES BY POINT OF SERVICE FOR PERSONS WITH CONSTIPATION OR IRRITABLE BOWEL SYNDROME PLUS CONSTIPATION IN THE 6 MONTHS BEFORE AND AFTER DIAGNOSIS: AN EMPLOYER PERSPECTIVE

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Introduction:

- Constipation and Irritable Bowel Syndrome with Constipation (IBS+C) impose substantial direct and indirect costs on the healthcare system and impair health-related quality-of-life.[1-5]
- Recent research demonstrates:
  - The projected total incremental direct costs for constipation in all US employees is $3.12 billion per year.[3]
  - The total direct costs in the US for healthcare encounters where constipation is the primary diagnosis exceeds $235 million annually.[4]
  - Patients presenting for GI complaints within the Group Health Cooperative health system incur annual mean direct costs of $5,049 for IBS and $7,522 for constipation.[5]
- Understanding how direct costs of constipation and IBS+C are segmented throughout the healthcare system is important to managed care payers for effective cost containment.
- While some point-of-service (POS) direct cost analyses have been conducted on IBS,[6-8] none have compared IBS+C with Constipation.
- Constipation and IBS+C may have a similar cost impact on the healthcare system.
- This cost impact is also relevant to employers who fund healthcare.

Aim:

- To examine the comparative direct cost burden of constipation and IBS+C for insured employees by quantifying direct costs of illness by point-of-service throughout the healthcare continuum.

Methods:

- A retrospective analysis was performed on data extracted from the Human Capital Management Services (HCMS) Research consisting of approximately 510,000 employees representative of the US Employed Civilian Labor Force (2004).
- Patient healthcare claims from 1/1/2001 to 6/30/2006 were included in the analysis.
- All research adhered to HIPAA Guidelines.
- Healthcare for the entire employee cohort was provided through managed care plans contracted by respective employers.
- International Classification of Diseases v.9 (ICD-9) codes in claims records were used to identify employees with primary, secondary, or tertiary diagnoses:
  - 564.0 (Constipation)
  - 564.00 (Constipation, Unspecified)
  - 564.01 564.01 (Constipation, Slow Transit)
  - 564.09 (Constipation, Other)
  - 564.1 (IBS)
- IBS+C was represented by the condition where an ICD-9 for Constipation plus an ICD-9 for IBS were co-occurring in the employee's claims records.
- Two cohorts were created for comparison purposes:
  - Constipation (C) cohort: Employees with at least one record of constipation diagnosis (constipation ICD-9 codes listed above) and no ICD-9 for IBS.
  - Irritable Bowel Syndrome plus constipation (IBS+C) cohort: Employees with at least one record of constipation diagnosis (constipation ICD-9 codes listed above) and at least one record of IBS diagnosis (ICD-9 for IBS).
- The index date in the C cohort was defined as the date of first diagnosis of constipation during 2001 or later as noted by ICD-9 code in the claims record.
- The index date in the IBS+C cohort was defined as the date of first diagnosis of IBS during 2001 or later as noted by ICD-9 code in the claims record.
- Employees were required to be continuously employed and eligible for health benefits for at least six months before and six months after their index date.
- C and IBS+C cohorts were compared over the six months preceding and following the employee's "index date."
- The following outcomes measures were compared between C and IBS+C cohorts:
  - POS direct costs:
    - Direct medical costs: Doctor's Office; Inpatient Hospital; Outpatient Hospital or Clinic; Emergency Department (ED); Laboratory; and "Other."
    - Prescription Drug (Rx) costs.
  - Per member per month (PMPM) costs for each POS category.
  - Total direct costs: direct medical costs + Rx costs.

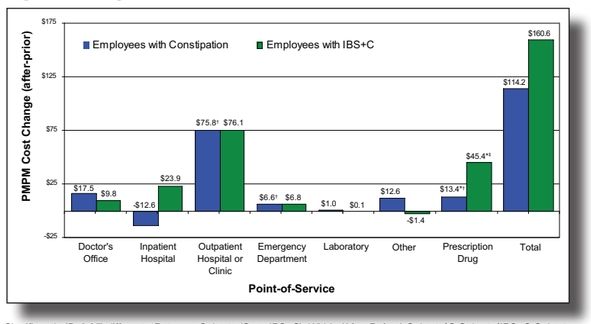
Statistical Analysis:

- For each employee in the IBS+C cohort, 5 C employees were matched using logistic regression and propensity scores for 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,[9] region (defined by first digit of employee's postal zip code), and existence of a direct medical claim.
- All costs were adjusted to 2006 dollars.
- Differences were explored for significance:
  - Between cohorts (C vs. IBS+C), for the:
    - 6 months prior to the index date,
    - 6 months after the index date, and
    - Change (after minus prior)
  - Within cohorts (6 months prior to index date vs. 6 months after index date)
- Significant differences in costs between and within cohorts C and IBS+C cohorts were defined via *t* tests at $P < 0.05$.

Results:

- Data were available for 203 IBS+C employees and 1015 propensity-score matched C employees (**Table 1**).
  - Following propensity score matching, no significant differences in the demographic and other matching variables were observed between cohorts.
- Comparison of direct PMPM POS costs showed few significant differences between the C and IBS+C cohorts (**Table 2**)
  - Non-significant cost differences (all $P > 0.05$):
    - For all variables in the "before" period.
    - After period costs in the Outpatient Hospital/Clinic, Doctor's Office, ED and Laboratory were almost identical between the cohorts.
    - After period costs in the Inpatient Hospital were $228.1 for C and $137.4 for IBS+C, however the $90.8 difference was not significant
  - Significant differences (all $P < 0.05$) between C and IBS+C cohorts were observed for after period:

Figure 1: Change in Per Member Per Month Point-of-Service Costs



Significantly ($P<0.05$) different: *Between Cohorts (C vs. IBS+C); Within (After-Before) Cohort: †C Cohort; ‡IBS+C Cohort

- "Other" costs were $18.3 for C vs. $2.6 for IBS+C (difference between cohorts $15.6, $P=0.0426$)
- Prescription drug costs were $977 for C and $136.7 for IBS+C (difference between cohorts -$39.0, $P=0.0062$)
- Comparison of direct PMPM POS costs showed few significant differences within (prior - after) the C and IBS+C cohorts (**Figure 1**) although nearly all POS cost categories were higher after diagnosis
  - Both cohorts significantly increased their expenditures for Prescription Drugs (C by $13.4 and IBS+C by $45.4, both $P<0.001$).
    - Prescription drug changes also significant between cohorts
  - The C cohort also significantly increased for:
    - Outpatient Hospital or Clinic ($75.8, $P=0.0018$) and
    - Emergency Department ($6.6, $P=0.0448$)

Limitations:

- Both constipation and IBS+C may be underreported in healthcare databases due to ICD-9 coding anomalies.
- Cohorts were composed of continuously employed subjects, suggesting a relatively healthy population for analysis and the potential for underestimation of disease burden.
- The clinical diagnosis of IBS-C must be inferred from the operational definition of the IBS+C cohort

Table 1: Descriptive Statistics for Matched Cohorts of Employees with Constipation vs. Employees with IBS+C

	Employees with Constipation		Employees with IBS+C		
Characteristic	N	Mean (S.E.) or n (%)	N	Mean (S.E.) or n (%)	Difference
Age (at index date), years	1,015	40.83 (0.34)	203	39.55 (0.73)	-1.28
Tenure, years	1,015	7.47 (0.23)	203	6.92 (0.48)	-0.55
Female, %	1,015	742 (73.1)	203	160 (78.8)	5.7%
Married, %	995	488 (49.0)	199	89 (44.7)	-4.3%
White, %	1,015	576 (56.7)	203	121 (59.6)	2.9%
Black, %	1,015	124 (12.2)	203	24 (11.8)	-0.4%
Hispanic, %	1,015	160 (15.8)	203	30 (14.8)	-1.0%
Exempt, %	1,015	373 (36.7)	203	79 (38.9)	2.2%
Full Time, %	1,015	986 (97.1)	203	195 (96.1)	-1.1%
Annual Salary, US $	1,015	$51,913 ($1,070)	203	$51,702 ($2,069)	-$211

All variables similar ($P>0.05$). S.E. = Standard Error

Table 2: Between Cohort Per Member Per Month Point-of-Service Costs

	Employees with Constipation (N=1015)	Employees with IBS+C (N=203)	Constipation vs. IBS+C Between Cohort Difference in means, $ US
Per Member Per Month Cost	Adjusted Mean Cost, $ US	Adjusted Mean Cost, $ US	
Prior to Diagnosis			
Doctor's Office	$110.2	$118.0	-$7.8
Inpatient Hospital	$240.8	$113.5	$127.3
Outpatient Hospital or Clinic	$187.8	$187.5	$0.3
Emergency Department	$10.4	$8.9	$1.6
Laboratory	$3.3	$5.6	-$2.4
Other	$5.7	$4.1	$1.7
Prescription Drug	$84.4	$91.3	-$7.0
Total	**$642.5**	**$528.8**	**$113.8**
After Diagnosis			
Doctor's Office	$127.7	$127.7	-$0.1
Inpatient Hospital	$228.1	$137.4	$90.8
Outpatient Hospital or Clinic	$263.6	$263.5	$0.1
Emergency Department	$17.1	$15.6	$1.4
Laboratory	$4.2	$5.7	-$1.5
Other	$18.3	$2.6	$15.6*
Prescription Drug	$97.7	$136.7	-$39.0*
Total	**$756.7**	**$689.4**	**$67.4**

* Significant Difference Between cohorts ($P\leq0.05$).

Summary and Conclusions:

- Both constipation and IBS+C are associated with substantial direct cost of illness similar in magnitude to other chronic diseases,[10] which can be a large financial liability to payers and employers.
- The only cost differences between groups in the after period were for:
  - Prescription drugs, which may be due to medications that are uniquely indicated for IBS+C.
  - "Other" services, which were higher for the constipation cohort.
- Prescription drug costs for both cohorts increased significantly within groups (after-prior)
- Outpatient hospital or Clinic costs and ED costs also significantly increased in the constipation cohort after diagnosis.
- Within (after-prior) cohort costs were increased for most categories in both cohorts, but did not consistently reach significance.
- These results indicate an opportunity for improved management of patients with both constipation and IBS-C, which may result in reduced costs from a payer and an employer perspective.

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NOTES

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ABSTRACT

PURPOSE: Both constipation (C) and irritable bowel syndrome plus C (IBS+C) are known to be very costly. However, it is unknown whether the costs of C are driven by the same factors that drive the costs of IBS+C. We aimed to assess the cost of illness (COI) for C without and with IBS (IBS+C) by point of service.

METHODS: A retrospective analysis was conducted using multiple US-based employers' health claims data from 2001-2005. Data included medical, pharmacy, payroll, and demographics. ICD-9 Codes were used to include employees in the C cohort: 564.0 (Constipation), 564.00 (Unspecified), 564.01 (Slow Transit), and 564.09 (Other). Employees with C and an ICD-9 for IBS (564.1x) at any time were included in the IBS+C cohort. Propensity-scores based on demographics, job-related variables, region, existence of medical claims, and Charlson Comorbidity Index Score were used to match 5 C to each IBS+C cohort employee. For both cohorts, the index date was the date of the first claim for the condition. Per member per month (PMPM) costs (adjusted to 2006$s) were compared for each category based on claims from: doctor s office, inpatient hospital, outpatient hospital/ clinic, emergency department (ED), laboratory, other locations, and pharmacy. Costs were compared between groups before diagnosis, after diagnosis, and change (before – after).

RESULTS: Data were available for 203 persons with IBS+C and 1,015 propensity-score-matched C subjects. Between group comparisons (before, after, and change) were all non-significant except for Rx drugs ($39 higher for IBS+C, $P<0.05$) and other ($14 higher for C, $P<0.05$) in the after period as well as the change for Rx drugs ($32 higher for IBS+C, $P<0.05$). Within groups, costs for Rx Drugs significantly increased in both cohorts and outpatient and ED significantly increased for the C cohort.

CONCLUSION: Patients with constipation and IBS+C incur similar costs throughout the healthcare system.

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