The Healthcare and Economic Impact of Diarrhea in US Patients with Carcinoid Syndrome

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BACKGROUND

- Carcinoid syndrome (CS) is caused by neuroendocrine tumors actively secreting serotonin.
- One of the most common symptoms is diarrhea. Among patients with CS, those with diarrhea have particularly poor quality of life.[1]

OBJECTIVE

- The study objective was to quantify the healthcare and economic burden of diarrhea in patients with CS in an insured US population.

METHODS

Study Design and Data Source

- Retrospective cohort study using MarketScan® from 1/1/2003 to 12/31/2012.

Patient Identification

- Patients newly diagnosed with CS had 1 medical claim for CS (International Classification of Diseases, Ninth Revision, Clinical Modification [ICD-9-CM] code 259.2) plus ≥1 additional claim for either CS or carcinoid tumors (ICD-9-CM 209.x), in any diagnostic field.
- The index date was the date of first evidence of CS during the identification (ID) period (1/1/2003 – 12/31/2011).
- All patients were required to have no evidence of CS for 1 year prior to the diagnosis of CS (disease-free period) and were followed for 1 year.
- Patients were excluded if they had evidence of CS during the disease-free period or were not continuously enrolled either during the disease-free period or for 1 year after the index date.
- Patients were defined as having diarrhea possibly related to CS if they had ≥1 claim with non-infectious diarrhea (ICD-9-CM codes 564.5 and 787.91) in any diagnosis field.

Outcomes

- We compared healthcare resource utilization (HRU) and costs within 1 year of CS diagnosis among patients with and without diarrhea.

Other Measures

- Patient demographics: age, sex, geographic region
- Number of chronic conditions and Charlson Comorbidity Index (CCI)

RESULTS

- The entire study cohort included 2,822 patients newly diagnosed with CS (**Table 1**).
- Mean age was 51.5 years and 56.9% were women.
- Patients with diarrhea differed significantly from those without diarrhea only in terms of proportion of women (62.4% vs. 55.6%, p=.005) and not other characteristics.
- Patients with diarrhea used significantly more healthcare resources than those without diarrhea for all HRU metrics of interest (**Table 2**).

RESULTS (continued)

- Patients with diarrhea accrued 58.9% higher annual total costs than those without diarrhea (p<.001; **Figure 1**).
- Patients with diarrhea had significantly higher non-pharmacy (p<.001) and pharmacy-related costs (p<.001) compared to those without diarrhea.

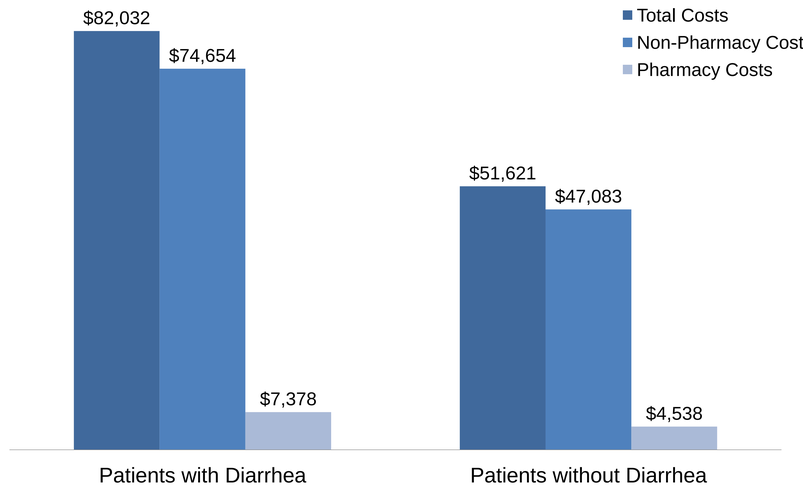
TABLE 1. Patient Demographics and Comorbidities

Patient Characteristic	With Diarrhea N=534; 18.9%	Without Diarrhea N=2,288; 81.1%	Newly Diagnosed CS Patients N=2,822	P Value
Age, mean (SD)	51.3 (9.9)	51.6 (10.1)	51.5 (10.1)	0.639
Female, no. (%)	333 (62.4)	1,273 (55.6)	1,606 (56.9)	0.005
Charlson comorbidity index, mean (SD)	3.7 (3.9)	3.6 (3.8)	3.6 (3.8)	0.643
No. of chronic conditions, mean (SD)	4.0 (2.4)	3.4 (2.0)	3.5 (2.1)	<.001

TABLE 2. Healthcare Utilization within 1 Year of CS Diagnosis

Utilization Metric	With Diarrhea	Without Diarrhea	P Value
Overall Healthcare Utilization			
Any hospitalizations, no. (%)	265 (49.6)	907 (39.6)	<.001
Total hospital days among hospitalized patients, mean (SD)	11.6 (13.4)	8.0 (9.2)	<.001
Any ED visits, no. (%)	201 (37.6)	479 (20.9)	<.001
No. of office visits, mean (SD)	25.5 (18.4)	18.7 (15.8)	<.001
CS-Related[a] Healthcare Utilization			
Any hospitalizations, no. (%)	73 (13.7)	165 (7.2)	<.001
Total hospital days among hospitalized patients, mean (SD)	7.4 (7.1)	5.5 (3.6)	0.029
Any ED visits, no. (%)	59 (11.0)	101 (4.4)	<.001
No. of office visits, mean (SD)	6.9 (7.8)	4.1 (6.1)	<.001

FIGURE 1: Healthcare Costs



[a] Claims with a primary diagnosis associated with carcinoid syndrome (ICD-9-CM 259.2), carcinoid tumors (209.x), non-infectious diarrhea (564.5, 787.91), nausea/vomiting (787.0x), flushing (782.62), asthma (493.x), dyspnea/wheezing (786.0x), cardiac palpitations (785.1), hypotension (458.x), asthenia/fatigue (728.87, 780.71, 780.79), dizziness (780.4), or intestinal obstruction (560.0, 560.2, 560.9).

LIMITATIONS

- We assumed that diarrhea was the result of CS, even though diarrhea has many other potential etiologies. This assumption could have falsely elevated our estimates of the frequency of diarrhea in CS. On the other hand, our exclusion of certain ICD-9-CM codes (e.g., gastroenteritis) that were not clearly “diarrhea in CS-related” could have falsely reduced estimates.
- Coding errors could have missed or misattributed HRU/cost claims related to CS.
- We did not have access to clinical notes in this study and only patients with commercial insurance were included in the study.

CONCLUSIONS

- The health care cost and medical resource utilization in newly diagnosed CS patients with diarrhea was consistently shown to be significantly higher (p<.05) than in those without this diagnosis.
- Management of diarrhea in patients with CS should reduce costs and utilization.

COMMENTS

- In addition to healthcare resource utilization and cost burden, diarrhea in NET may result in a considerable quality of life burden, as reported by Beaumont *et al*.[1]

References

1. Beaumont JL, et al. Comparison of health-related quality of life in patients with neuroendocrine tumors with quality of life in the general US population. *Pancreas*. 2012 Apr;41(3):461-6.

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