

The Cost Impact of Non-Infectious Diarrhea in Patients with Carcinoid Syndrome

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Background: Carcinoid syndrome (CS) refers to the hormonal effects of carcinoid tumors, and typically includes non-infectious diarrhea (NID). Despite their high frequency in patients with CS, the healthcare costs and utilization associated with NID has not been elucidated.

Methods: Using MarketScan® (11/2002-12/31/2012) commercial insurance claims, we identified newly-diagnosed CS patients with a first medical claim for CS (ICD-9-CM code 259.2) and either an additional claim for CS and/or a claim for carcinoid tumor (209.x). Patients had to be CS free for 1 year prior to index CS diagnosis date. Multiple measures of healthcare utilization and cost were reported for the first year post index diagnosis of CS, stratified by evidence of NID (ICD-9-CM codes 564.5, 787.91). Results were reported before and after adjusting for demographics, US region, and conditions.

Results: Of 2,822 newly-diagnosed CS patients (mean age: 51.5 years; women: 56.9%; mean Charlson Comorbidity Index: 3.6), 534 (18.9%) had NID after CS diagnosis. Annual healthcare costs in patients with NID were \$82,032 versus \$52,621 in patients without NID. After adjusting for baseline differences between groups, patients with NID had higher mean number of office visits, inpatient hospitalizations, and ED visits (all $p < 0.001$) one year post CS diagnosis. Adjusted risk of hospitalization was 49.3% in patients with NID vs. 39.7% in

patients without NID (odds ratio: 1.48; 95%-CI: 1.22-1.79). Patients with NID had higher adjusted total annual costs (+\$28,645), pharmacy costs (+\$2,441), non-pharmacy costs (+\$26,205), visit costs (+\$15,718), and inpatient hospitalization costs (+\$11,425) compared to those without NID (all $p < 0.001$).

Conclusion: NID in CS patients is associated with a significantly increased healthcare utilization the year following initial CS diagnosis and an additional \$30,000. The odds of hospitalization among CS patients with NID are about 1.5 times of those without NID. Future studies should focus on the humanistic burden of NID symptoms on CS patients' lives.