Economics of Emergency Department Visits by Patients with Inflammatory Bowel Disease: A Real-World Analysis

Kofi Clarke, MD¹, Arsh Momin, MD², Michelle Rosario, MD¹, August Stuart, MS¹, Shannon Dalessio, MA¹, Andrew Tinsley, MD¹, Emmanuelle Williams MD¹, Matthew Coates, MD, PhD¹

¹Division of Gastroenterology and Hepatology, Department of Medicine, Penn State College of Medicine, Hershey, PA, USA

²Division of General Internal Medicine, Department of Medicine, Penn State College of Medicine, Hershey, PA, USA

Corresponding author:
Kofi Clarke MD, AGAF, FACP, FRCP (London)
Penn State Health Milton S. Hershey Medical Center
Penn State Inflammatory Bowel Disease Center
500 University Drive, M.C. HU33, Hershey PA 17033
717-531-3694
kclarke@pennstatehealth.psu.edu
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Conflicts of Interest

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Author Contributions

K.C.: conception; writing, reviewing, and editing
A.M.: data collection and interpretation; writing original draft
A.S.: data acquisition and analysis; writing, reviewing, and editing
M.R., S.D., A.T., M.C., E.M.: writing, reviewing, and editing

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Abstract

Background
Inflammatory Bowel Disease (IBD) is associated with significant psychosocial, economic, and physical burden on patients. IBD care in the United States results in significant health care expenditure with recurring Emergency Department (ED) care and hospital admissions. Despite advances in therapy and improved access to specialty care, there is still room for improvement in cost efficient care. Specialty medical homes and interdisciplinary care models have emerged as ways to improve medical care, patient outcomes, and quality of life, as well as improve the impact of healthcare costs. There is limited real world data on cost in the U.S., with many articles citing cost estimates from models.

Methods
We analyzed real world data from our tertiary care center with a focus on recurrent ED visits by IBD patients. Descriptive statistics were used for a cost analysis of multiple ED visits by IBD patients. Patients with ≥4 visits to the ED in a six-month period were described as SuperUsers and were included in a separate analysis. Cost of hospitalization was also included.

Results
Total cost associated with all ED visits from SuperUsers were $72,999.57 with an average of $6,636.32 per patient. When the patients were admitted, the total cost of ED visits and hospitalizations was $721,461.52, with an average of $65,587.41 per patient.
Conclusions

ED utilization by IBD patients with or without hospitalization is expensive and is typically driven by a cohort of SuperUsers. More work needs to be done to improve cost effectiveness in IBD care, including reducing frequency of ED visits.

Key Words

Inflammatory Bowel Disease, Cost, Emergency Department
Graphical abstract

Patients with IBD who are emergency department (ED) SuperUsers contribute significantly to the cost of IBD care. Their need for frequent ED visits may be a signal for the need for more targeted follow-up and better disease control. This will require a multifaceted, multidisciplinary team approach as demonstrated in the Specialty Medical Home model, or similar models. Further multicenter studies are needed to better understand this phenomenon and develop easy to adopt follow-up models.
Lay Summary

IBD patients with uncontrolled disease may have frequent visits to the emergency department and/or multiple hospitalizations. This results in expensive care with worse outcomes. Health care professionals and patients should work together to optimize care for better outcomes.
Introduction

Inflammatory bowel disease (IBD) is chronic immune-mediated spectrum of diseases that includes Crohn’s Disease (CD), Ulcerative Colitis (UC), and Undifferentiated IBD (IBDU). It is characterized primarily by inflammation in the gastrointestinal tract and can include multiple organ systems outside the gastrointestinal tract. It is estimated that 3.1 million of American adults are affected with IBD. The disease course is characterized by recurring patterns of disease activity with periods of remission. Recurring cost of healthcare can be prohibitive and is largely driven by acute care services, hospitalizations, emergency department (ED) services, medications, and surgery. There is also the added social costs of lost workdays, toll on caregivers, and emotional toll on patients.

There are many challenges in estimating the cost of medical care for IBD patients in the United States. This is contributed to by lack of regulation on drug pricing, lack of transparency of costs, insufficient data on indirect costs, and variability of cost based on commercial and governmental insurance. National health care data from 1996 to 2016 indicate that IBD healthcare-associated costs were estimated at $25.4 billion per year. Of this amount, 55.8% was spent on ED visits and inpatient hospitalizations. Over the course of these two decades, both ED costs and costs of hospitalizations have progressively increased. However, this data was derived from cost models, and real-world data is limited. We present real world data from ED visits to our tertiary care hospital facility with a multidisciplinary IBD center.

Materials and Methods

Patients seen at our tertiary care center ED from January 1, 2019 to July 1, 2019 and received outpatient IBD gastroenterology specialist care within our tertiary medical center between July 1, 2018 and July 1, 2019 were identified and included in the analysis. ED visits for non-IBD related ICD-10 codes were excluded from the analysis. SuperUsers were identified as individuals with four or more ED visits during the six-month period. Additional analysis was conducted using SuperUser data including demographic data and IBD disease course. Billing data from our institution was used to determine ED and hospitalization costs.
**Ethical Considerations**

This study was approved by the Institutional Review Board. All patients were enrolled in our IBD consented registry and no identifying data was available.

**Results**

Real world costs of emergency room visits in IBD patients are prohibitive and are increased tenfold when associated with admission.

A total of 211 patients with IBD were included in the analysis. Eleven were identified as SuperUsers from predefined criteria: ≥4 visits to the ED during the six-month period. Of these SuperUsers, 3 were male (27%) and 8 were female (73%) (Table 1). Ages ranged from 28 to 87 (\( \bar{x} =39 \)). The number of ED visits per SuperUsers ranged from a minimum of 4 to a maximum of 13 over the analyzed six-month period. Of the 11 SuperUsers, 6 had CD (55%), 3 had UC (27%), 1 was diagnosed as IBDU (9%), and 1 had a history of UC and subsequent CD of the pouch (9%).

Average disease duration was 11.5 years with a range of 1 to 25 years (\( \bar{x} =10 \) years).

ED admission rate for SuperUsers was 38.2% compared to 31.1% for non-SuperUsers (p=0.314). The average cost of an ED visit for SuperUsers was $1,095 compared to $940 for non-SuperUsers. The average cost of a SuperUser ED visit that led to an inpatient admission was $24,333 and $17,477 for the non-SuperUser group (p=0.149). The cost of ED visits and hospitalizations for SuperUsers averaged $76,277.57, per patient. Conversely, the total cost of ED visits and hospitalizations for non-SuperUsers was $9,038.97, per patient. When broken down per ED visit, the average cost of a SuperUser ED visit to include inpatient costs if admitted was $11,095 while a non-SuperUser cost was $6,540.

For SuperUsers the total cost associated with all ED visits were $72,999.57 with an average of $6,636.32 per patient. When the SuperUsers were admitted, the total cost of ED visits and hospitalizations was $721,461.52, with an average of $65,587.41 per patient (Table 2).
Discussion

We describe the real-world direct costs of ED utilization by IBD patients who are SuperUsers. Patients with IBD who frequently visit the ED experience higher costs for ED visits alone and when combined with the cost of hospitalization, even while the rates of admissions do not differ significantly between SuperUsers and non-SuperUsers. In a previous study by Kappelman et al. the mean annual costs for a patient with Crohn's Disease was $8265 and $5066 for a patient with ulcerative colitis. Our data is striking that the significantly higher per ED visit costs are driven by a cohort of SuperUsers ($6636.32). Furthermore, Kappelman et al. reported that 31-38% of the annual cost of IBD came from hospitalizations, with outpatient care and pharmaceutical claims making up the rest of the costs. It is also noteworthy that in comparison with other chronic conditions: 1) the average cost for admission for heart failure is $11,840 and for an ED visit without admission is $1208 and 2) for chronic obstructive pulmonary disease, annual cost is $3823 with an average of $1,474 on hospitalizations and only $56 spent on emergency department visit.

Another worthwhile consideration when analyzing the cost of healthcare is the health insurance status of individuals. While we were not able to obtain health insurance information for the non-SuperUser cohort, in a cross section of 360 patients at our IBD clinic we found that 50.6% of patients carried public health insurance and 49.4% of patients were covered under private health insurance programs. We expect that the non-SuperUser cohort would follow a similar trend. In contrast, with the exception of one SuperUser who carried private insurance, the rest of the SuperUser cohort was covered under public health insurance programs.

In 2018, the University of Pittsburgh Medical Center sought to reduce unplanned care, disease activity, and increase quality of life for patients with IBD. They designed a novel health care model with a multidisciplinary team of specialists to manage patients with chronic conditions. This model resulted in a 47.3% reduction of emergency department visits and a 37.9% decrease in hospitalizations, and increased quality of life for their patients.
Our dedicated IBD center provides similar access to a multidisciplinary healthcare team. These include gastroenterologists who are IBD specialists, advanced practice providers, colorectal surgeons, a nutritionist, ostomy care specialists and psychiatrists. Other ancillary resources include pain specialists, dermatologists, rheumatologists, and endocrinologists. Patients are further supported by access to nurse navigators to help facilitate plans of care, improve access to healthcare, and work with the aforementioned team to triage levels of care. Previous work has described the benefits of the nurse navigator model with specific improvements in no-show rates, reduced wait times, increased involvement in research, and most importantly, improved patient satisfaction. Despite these advancements, more work needs to be done to improve cost effectiveness in IBD care targeted at the specific subgroups who require additional support. Our study has a few limitations. It is from a single center and limited by a relatively small number of patients. Additionally, the high variability in inpatient treatment courses, ranging from brief observation to surgery, made our price comparisons between groups statistically insignificant. However, we sought to also describe a specific subgroup of patients of SuperUsers who may require targeted support within the larger cohort of IBD patients.

Conclusion

Real world costs of unplanned care including ED utilization in patients with IBD is prohibitive. This is especially so in specific subpopulations who access ED care frequently. Addressing the costs of IBD SuperUsers requires a multi-faceted approach that integrates ethical considerations, clinical expertise, and consideration of cost-effective services.

Data Availability Statement

All data generated during this study are included in the article.
References


Table 1. Individual SuperUser characteristics and costs associated with ED utilization and hospital admissions

<table>
<thead>
<tr>
<th>Total ED cost</th>
<th>Total cost (ED visit and admissions)</th>
<th>ED visits</th>
<th>Gender</th>
<th>Age (Years)</th>
<th>IBD Diagnosis</th>
<th>Years IBD</th>
<th>Insurance Type</th>
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<td>$8,396.45</td>
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<td>M</td>
<td>49</td>
<td>CD</td>
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<td>M</td>
<td>48</td>
<td>CD</td>
<td>10</td>
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<tr>
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<td>$17,116.58</td>
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<td>F</td>
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<td>CD</td>
<td>3</td>
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<td>$7,427.78</td>
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<td>F</td>
<td>87</td>
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<td>1</td>
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<tr>
<td>$4,175.19</td>
<td>$7,587.76</td>
<td>5</td>
<td>F</td>
<td>28</td>
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<td>10</td>
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<tr>
<td>$4,841.35</td>
<td>$90,666.02</td>
<td>5</td>
<td>M</td>
<td>70</td>
<td>UC / CD of pouch</td>
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<td>F</td>
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<tr>
<td>$5,153.41</td>
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<td>UC</td>
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<td>Medicaid</td>
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Table 2. Mean, Median and Sum of costs for SuperUsers

<table>
<thead>
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<th>Total cost (ED visit and admissions)</th>
<th>ED visits (#)</th>
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<tbody>
<tr>
<td>Total</td>
<td>$ 72,999.57</td>
<td>$ 721,461.52</td>
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<tr>
<td>Mean</td>
<td>$ 6,636.32</td>
<td>$ 65,587.41</td>
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<td>Median</td>
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