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ORIGINAL ARTICLE

## Comparison of Emergency Room Use Between African-American and Caucasian Inflammatory Bowel Disease (IBD) Patients

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### ABSTRACT

**AIM:** Inflammatory bowel disease (IBD) is a chronic condition becoming increasingly prevalent in the African-American (AA) population. We aimed to compare ED utilization between AA and non-Hispanic Caucasian (C) IBD patients in a large tertiary care

referral center.

**MATERIAL AND METHODS:** A retrospective chart view was performed on IBD patients seen in the Emory University Hospital ED after Institutional Review Board approval.

**RESULTS:** Data from 391 patients including 244 C patients and 147 AA patients was available for analysis. There were more AA patients who had  $\geq 2$  ED visits compared to C patients. When assessing the number of ED visits based on whether the visits were IBD-related vs non-IBD related, more AA patients had  $\geq 2$  visits for both types of visits. In the multivariable logistic regression analysis, factors associated with IBD related visits included younger age, AA race, male sex, a diagnosis of ulcerative colitis, being a current patient in the Emory GI clinic, and prior history of IBD-related surgery.

**CONCLUSION:** Our study reveals that AA IBD patients seen in the ED more individuals visited the ED more than once for both IBD and non-IBD related issues compared to C IBD patients.

**Key words:** IBD, emergency department, Caucasian, African-American

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### INTRODUCTION

Inflammatory bowel disease (IBD) is a chronic relapsing-remitting condition that affects 1 in 200 persons and leads to significant healthcare utilization and cost<sup>[1]</sup>. Recent data has shown that IBD is an “equal opportunity” disease becoming increasingly prevalent in African-American (AA) patients<sup>[2]</sup>. Racial disparities have been reported for treatment and outcomes in children and adults with IBD and deserve further study to improve patient outcomes<sup>[3]</sup>.

The emergency department (ED) contributes about 10% of all ambulatory care visits in the US<sup>[4]</sup>. Patients with IBD are high

consumers of health care services, leading to annual direct health care costs as high as \$6.3 billion in the United States alone<sup>[5]</sup>. From 2006-2014, there has been a 51.8% increase in emergency room (ED) visits by IBD patients<sup>[6]</sup>. IBD patients are at risk of utilizing ED services due to abdominal pain, diarrhea, and IBD-related complications such as perforation or obstruction. Psychological factors such as depression and opioid addiction may also play a role. One study using an administrative database of over 19,000 IBD patients, reported that the mean number of excess ED visits (i.e. number exceeding the mean for healthy controls) between 2003 and 2004 was 20.1 for Crohn's Disease (CD) patients and 10.3 for ulcerative colitis (UC) patients per 100 persons<sup>[7]</sup>. While in many cases ED visits may be unavoidable, decreasing inappropriate use of ED is an important goal for IBD providers.

Several studies have examined ED utilization based on race across several disease states. A study by Nietert and Silver investigating ED use by patients with scleroderma concluded that non-white populations, in particular the AA population, had an increased number of ED visits<sup>[8]</sup>. A similar trend was seen in cardiovascular conditions, with increased number of AA men and women presenting to the ED compared to other ethnicities<sup>[9]</sup>. Nguyen *et al.* reported that there were a higher rate of ER visits among IBD black patients compared to white patients and 85% of these visits were "non-life-threatening". The researchers noted the ER visits were not related to increased disease severity as AA's IBD patients had lower rate of chronic steroid use and other disease severity indices. In addition, there was no difference in hospitalization<sup>[10]</sup>.

Disparities in utilization of healthcare resources such as radiologic exams by the ED are also an area of ongoing research in the general population. One study found that black patients were significantly less likely to undergo head CT for evaluation of headache<sup>[11]</sup>. Another study found that non-Hispanic blacks were less likely to receive opioid prescription at discharge<sup>[12]</sup>.

We aimed to provide an in-depth comparison of ED utilization including utilization of healthcare resources in the ED between AA and non-Hispanic Caucasian (C) IBD patients in a large tertiary care referral center and to determine variables associated with ED utilization. Given the increasing number of patients being diagnosed with IBD, including both AA and C patients, it is important to perform studies such as ours to improve the quality of care for these patients and to also assist in decreasing use of unnecessary healthcare utilization.

## METHODS

### Subjects/Study Design

This is a retrospective observational study aiming to compare ED utilization between African-American and Caucasian IBD patients in a large tertiary care referral center. The Human Research Protection Office (institutional review board) at Emory University School of Medicine granted approval for retrospective review of clinical records for this study.

A list of all IBD patients seen in the ED between 1/1/2013 and 12/30/2014 was obtained by searching the ED data warehouse for patients with ICD9 codes 560.89 (Crohn's) and 556.9 (UC). Electronic medical records were reviewed to verify that patients had IBD. Inclusion required an established diagnosis of CD or UC based on prior clinic visits, endoscopy/histology and/or imaging. Patients without a diagnosis of IBD were excluded. The total number of ED visits was tracked from the medical record looking back starting three years preceding the ED visit. Patients who were diagnosed

with IBD after this period were excluded from the study. Visits were characterized as IBD-related or non-IBD related based on chart review of chief complaint for each patient. 441 unique patients were identified. Fifty patients were excluded from the study: 47 were excluded due to lack of definitive evidence of IBD diagnosis on chart review, one patient left against medical advice, one was an out-of-state resident, and one patient died in the year 2013. 391 patients were included in the final analysis. All patients were > 18 years of age.

### Chart review/Data Collection

The authors performing the chart review were not involved in medical management of the patients (SD, SL). We used a systematic data extraction process to review the medical record and collect patient demographics, clinical symptoms, IBD history, and medication history. All notes and records including in the patient's electronic medication chart were potential sources of data.

The variables collected included demographics and clinical characteristics applying to IBD severity (albumin, hemoglobin, BMI (which is lower in severe disease), smoking (which exacerbates Crohn's), as well as types of IBD medications. Next we collected data on the patient's ED visits including number and reason for visits, CT scans obtained in the ED (as a marker of radiation exposure), as well as narcotic and steroid prescriptions (which both carry potential harm and are markers of severe symptoms). Finally, data was collected regarding the inpatient hospital admissions and their length and whether surgery was performed. The variables were numerically coded for data analysis. All variables were categorical except age, BMI, hemoglobin, albumin, and length of stay, which were continuous variables.

### Statistical analysis

Chi-square test or ANOVA were used for categorical variables, and student's t-test was used for continuous variables to compare baseline characteristics, emergency department visits and inpatient admissions between African-American and Caucasian IBD patients. Continuous variables are reported as mean  $\pm$  standard error of the mean (SEM). To determine the significance of demographic data, comorbidities, insurance and clinical parameters in predicting IBD-related ED visits, first univariate and then multivariable logistic regression were performed, with the outcome variable being the presence of any IBD-related ED visits. The univariate analysis included the following variables: age, race, gender, disease type were included as forced variables due to their importance. Additionally, clinical variables were analyzed in the univariate analysis: BMI, smoking, albumin, hemoglobin, medications, and history of IBD surgery, as these variables all relate to disease severity in IBD. We also did a univariate analysis of care delivery factors such as private insurance vs medicare or medicaid, and if the patient was currently followed our institution's clinic. Parameters that demonstrated a  $p < 0.1$  on univariate analysis were included in the multivariate regression models. Exponentiated  $\beta$  values were calculated as approximations of independent variable odds ratios (OR).  $p < 0.05$  was considered statistically significant. All statistical analyses were performed using SPSS Statistics v. 22.0 (SPSS Inc., Chicago, IL).

Variables with missing data were analyzed, but the data was verified to be missing at random between AA and C groups with similar percentages missing in each group. The medicare/Medicaid variable is a subset of the insurance group so no significant data was missing in this variable. Most of the missing data relates to the patient's follow-up visits and their medications upon discharge

as some patients who frequented the ED were not followed at our institution.

## RESULTS

Data from 391 IBD patients including 244 C patients and 147 AA patients who visited the Emory ED at least once was available for analysis. Table 1 highlights the clinical and demographic comparisons between the two populations. AA IBD patients presenting to the ED were younger (39.36 vs 45.31,  $p < 0.01$ ). AA patients had statistically lower hemoglobin (12.7 vs 11.9,  $p \leq 0.01$ ). There were no other significant differences when evaluating IBD-type (CD vs. UC), prior surgery, or history of narcotic use (Table 1). There was no disparity in the types of medications between the groups with similar percentages of patients used biologics and immunomodulators. Missing data was random between the groups and was limited to  $< 10\%$  for all fields except follow-up and medications after discharge due to lack of documentation in the medical record.

AA patients in our study had more individuals with  $\geq 2$  ED visits compared to C patients (57.82% vs 43.44%,  $p < 0.01$ ) (Table 2). When assessing the number of ED visits based on whether the visits were IBD-related vs non-IBD related, AA patients were found to have  $\geq 2$  visits for both types of ED visits ( $p < 0.05$ ). There was no difference between AA and C in terms of steroid use at the time of the ED visit. In the ED, similar percentages of patients underwent a CT and similar numbers were discharged with narcotics (Table 2). Access to care was similar between AA and C with similar percentages insured.

The number of IBD-related hospital admissions from the ED was assessed between the two groups and no difference was seen. A higher percentage of AA patients who were admitted had CD. There were no statistical differences in surgeries during the admission or length of stay (Table 3).

In a multivariable logistic regression analysis, AA race remained significantly associated with IBD-related ED visits. Factors associated with IBD-related visits included younger age, AA race, female sex, a diagnosis of UC, and prior history of IBD-related surgery ( $p < 0.05$ ) (Table 4). Medicare/Medicaid insurance status almost reached a significant association with IBD-related visits ( $p = 0.05$ ). Interestingly, ED visits were not associated with other clinical factors such as types of IBD medications, smoking, lab values, and BMI. Aside from surgical history, demographic variables and insurance were the most important associations seen.

## DISCUSSION

In our cohort of 391 patients, our retrospective study reveals that AA IBD patients seen in the ED are more likely to have repeated visits to the ED than C IBD patients for both IBD-related and non-related IBD reasons in a tertiary care referral center. Almost two times as many AA IBD patients presented to the ED for IBD-related issues two or more times, and close to one and half times as many AA IBD patients presented for non-IBD related issues to the ED two or more times over the course of the study period. AA race was also found to be significantly associated with ED utilization in the logistic regression analysis. In addition, we looked at potential disparities in utilization of healthcare resources in the ED. There were no differences found in utilization of CT scans, steroids, or narcotics. The percentage of patients who ultimately required hospitalization was also similar between the two groups.

Similar to our findings, higher ED utilization amongst AA IBD patients has also been reported in other studies<sup>[10,13]</sup>. The reason

**Table 1** Clinical and demographic characteristics by race, Baseline characteristics (n = 391).

	Charact-eristics	Caucasians (n = 244)	African-ericans (n = 147)	P-value
Age (mean±SD)		45.31 (±18)	39.36(±14)	<0.01
Gender	Male	110 (45.08%)	58 (39.46%)	NS
	Female	134 (54.92%)	89 (60.54%)	
Disease type	CD	159 (65.16%)	105 (71.43%)	NS
	UC	85 (34.84%)	42 (28.57%)	
Smoking		29 (12.29%)	22 (15.07%)	NS
BMI		26.31 (±6.4)	26.72 (±6.0)	NS
Average Albumin		3.69 (±1.4)	3.46 (±1.2)	NS
Average Hemoglobin		12.69 (±0.5)	11.88 (±0.4)	0.001
Prior history of IBD Surgery		94 (39.5%)	49 (33.79%)	NS
Current or prior biologic use		70 (29.17%)	37 (26.06%)	NS
Immunomodulator use		56 (23.73%)	30 (21.43%)	NS
5ASA use		58 (24.79%)	38 (27.14%)	NS
History of narcotic use		75 (31.65%)	49 (34.27%)	NS

**Table 2** Characteristics of emergency department visits by race. Emergency department visits.

	Charact-eristics	Caucasians (n = 244)	African-ericans (n = 147)	P-value
Total # of ED visits	1	138 (56.56%)	62 (42.18%)	<0.01
	$\geq 2$	106 (43.44%)	85 (57.82%)	
# IBD related ED visits	0	120 (49.18%)	58 (39.46%)	0.02
	1	95 (38.93%)	56 (38.10%)	
	$\geq 2$	29 (11.89%)	33 (22.45%)	
# Non-IBD related ED visits	0	87 (35.66%)	63 (42.86%)	0.02
	1	116 (47.54%)	49 (33.33%)	
	$\geq 2$	41 (16.80%)	35 (23.81%)	
Current Emory GI patient during ED visit(s)		108 (44.26%)	55 (37.41%)	NS
Insured at ED visit		206 (89.57%)	126 (90.00%)	NS
Medicaid/Medicare (of those insured)		44 (30.34%)	19 (21.59%)	NS
# ED visits where patients are on Steroids	0	195 (84.42%)	115 (85.82%)	NS
	1	32 (13.85%)	16 (11.94%)	
	$\geq 2$	4 (1.73%)	3 (2.24%)	
CT Scan obtained in ED	0	162 (66.67%)	103 (70.07%)	NS
	1	67 (27.57%)	35 (23.81%)	
	2	9 (3.70%)	5 (3.40%)	
	$\geq 3$	5 (2.06%)	4 (2.72%)	
# narcotic prescriptions upon d/c from ED	0	73 (89.02%)	43 (78.18%)	NS
	$\geq 1$	9 (10.98%)	12 (21.82%)	
# times discharged with steroids	0	69 (97.18%)	47 (94.00%)	NS
	1	1 (1.41%)	2 (4.00%)	
	$\geq 2$	1 (1.41%)	1 (2.00%)	
# patients with any resulted hospital admission		126 (50.4%)	83 (56.5%)	NS

for increased utilization amongst our AA IBD patients requires further exploration. Previous studies have suggested that black patients report more difficulty than white patients for access to IBD specialists and are also concerned with cost<sup>[10]</sup>. Previous studies have also found that Medicaid patients are more likely to use ED than privately insured patients potentially due to convenience including inability to keep doctors' appointments during the day due to work

and cost (i.e. lack of need to pay copay). In our multivariate logistic regression analysis, Medicare/Medicaid status was found to be possibly associated with IBD-related ED utilization for all comers in this study ( $p = 0.05$ ). Another plausible reason is lack of control of disease. When assessing variables that may reflect disease severity, we found that AA IBD patients had lower hemoglobin compared to C IBD patients (C 12.7 gm/dL vs AA 11.9 gm/dL,  $p < 0.01$ ). However, no differences in number of IBD-related admissions were seen between the two populations. No differences in body mass index or albumin were seen. Additionally, no differences in use of biologics, immunomodulators, or steroids at time of ED visits were seen. Future studies utilizing clinical/endoscopic disease activity scores would be beneficial to determine how much active disease is playing a role in the increased utilization of ED services. Psychiatric comorbidities may have played a role given the significant percentage of IBD patients who suffer from anxiety and depression; however, we did not evaluate this in the current study.

We found that AA IBD patients who utilized the ED were likely to be younger than C IBD patients. Potential reasons for this could be disease related factors including earlier onset of disease compared to C IBD patients. However, recent data suggests that there is no difference in age of diagnosis of IBD between black and white IBD patients<sup>[14]</sup>. Other factors could be difficulties with navigating the healthcare system or ability to access care during normal clinic hours due to job related factors or cost concerns. A recent systematic literature search based study found reasons for increased ED utilization in the general population to include limited access to or confidence in primary physician, patient perceived urgency, convenience, views of family, friends, or other health professionals, and a belief that their condition required the resources and facilities offered by a particular healthcare provider<sup>[15]</sup>. Whether these factors could potentially play a role in more frequent utilization of the ED by younger AA IBD patients warrants further investigation.

In regards to care received in the ER, no differences in utilization of CT scans, dispensing of narcotics, or admissions to the hospital for IBD flares were seen. Previous studies suggest that black patients are less likely to receive narcotic analgesics than white patients and are also less likely to undergo diagnostic testing<sup>[16-18]</sup>. We did not find such disparities. A plausible reason for this is that the vast majority of studies investigating such disparities have been large population-based cohorts. Our study utilized data from a single academic tertiary care referral center. Disparities in utilization of CT scan, narcotics, and admissions to hospital may not be a factor in tertiary care centers. In our cohort of 391 IBD patients, 209 patients were admitted from the ER for IBD-related complications. No differences in number of IBD-related admissions and need for surgery were seen between the two populations, which is similar to what has been reported<sup>[19]</sup>. What we did note, however, is that a greater proportion of AA CD patients were hospitalized than C CD patients for IBD related complications (C 56% vs AA 70%,  $p = 0.0375$ ). Differences in disease severity between AA and C CD may be driving this finding. Previous studies have suggested that AA CD patients have a more severe disease phenotype including penetrating and stricturing disease than C patients, which may in turn lead to more hospitalizations<sup>[20]</sup>. The opposite was seen with UC in which a greater proportion of C patients with UC were hospitalized compared to AA (44 vs 30%,  $p = 0.0375$ ). One study found that AA UC patients were less likely to use corticosteroids and immunomodulators than C UC patients, which suggests a more benign phenotype and a diminished need for hospitalization<sup>[21]</sup>. No difference in length of hospital stay was seen between the two populations. This varies than what has been reported

**Table 3** Inpatient admissions

	Characteristics	Caucasians (n = 126)	African Americans (n = 83)	P-value
Disease type	CD	70 (55.56%)	58 (69.88%)	0.04
	UC	56 (44.44%)	25 (30.23%)	
# IBD-related Admissions	0	30 (37.50%)	16 (28.07%)	NS
	1	37 (46.25%)	27 (47.37%)	
	≥ 2	13 (16.25%)	14 (24.56%)	
IBD Surgery during any admission		18 (14.52%)	11 (13.58%)	NS
Average length of hospital stay		6.26 (±4)	6.56 (±3)	NS

**Table 4** Logistic regression analysis for variables predicting at least one IBD-related ED visit.

Variable	OR	95% CI	p-value
Age (older)	0.95	0.93-0.97	< 0.0001
Race (Caucasian)	0.5	0.3-0.9	0.04
Sex (female)	0.5	0.3-0.97	0.04
IBD Subtype (UC)	2.7	1.1-4.6	0.02
No prior history of IBD related surgery	0.5	0.2-0.9	0.02
Non-Medicare/Medicaid	0.5	0.218-1.011	0.05

Logistic regression analysis for variables predicting at least one IBD-related ED visit ( $n = 391$ ).

in the pediatric literature where it was found that black pediatric IBD patients have a longer length of stay than whites<sup>[22]</sup>.

In our multivariate logistics regression analysis, AA race remained significantly associated with IBD-related ED visits. However, IBD related medications including biologic agents were not associated with ED visits. This is in contrast to other literature. One study examined the effect of biologics in healthcare utilization in management of IBD and found a reduction in ED utilization<sup>[22]</sup>. Low BMI and active tobacco use in CD are associated with a worse prognosis and could potentially lead to increased utilization of the ED, however, these factors were not associated with ED visits in our study.

Our study has limitations. This was a single center study utilizing data collected from an academic tertiary care referral center. Outcomes in such centers may differ from other community-based practices. We were unable to more objectively assess severity of disease utilizing disease activity index scores. Such data was difficult to collect, as over 50% of IBD patients that were seen in the ED were not regular patients of our outpatient IBD clinic. In addition, the study did not account for potential ED visits to non-Emory sites. Geographic association may have played a role in the findings. We found that race was associated with ED utilization. However, given the number of variables included in the logistic regression analysis, the finding could have arisen due to chance. Given that we are limited by the information available in the charts, variables with missing data were analyzed, but the percentage of missing was similar between AA and C groups in all variables.

Our study supports the findings of previous studies showing higher utilization of ED by AA IBD patients compared to C IBD patients. Despite this difference, once patients sought care in the ED, no disparity was seen in utilization of healthcare resources or hospital-based outcomes at our tertiary care referral center. It will be important for future studies to determine specific factors including medical and psychosocial factors that are driving the higher ED utilization in AA

patients. In addition, the utilization of IBD based medical homes similar to other IBD centers that include a team of physicians, nurses, and social workers to specifically address such disparities may help to decrease the burden of ED utilization by AA IBD patients. Such IBD based medical homes have shown to decrease use of ED visits and hospitalizations and could prove beneficial to the patient population included in our study<sup>[24]</sup>.

#### Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. For this type of study formal consent is not required. This article does not contain any studies with human participants or animals performed by any of the authors.

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