

RESEARCH LETTER

Sex, Race, and Ethnicity Differences in Patients Presenting With Diverticular Disease at Emergency Departments in the United States: A National Cross-Sectional Study



Diverticular disease, including diverticulitis and diverticular bleeding, is one of the most common gastrointestinal diseases in the United States.^{1,2} Annually, diverticulitis alone is estimated to be responsible for more than 450,000 emergency department (ED) visits and 200,000 inpatient admissions in the United States, resulting in an healthcare expenditure of nearly 9 billion dollars.² A previous study by Wheat et al showed sex and race differences in the rates of hospitalization for diverticular disease.³ Likewise, Bollom et al showed sex differences in diverticulitis prevalence in the ED in 2013.⁴ However, it is unclear if sex differences have persisted or if race/ethnicity differences exist among patients presenting to the ED, which represents a wider spectrum of disease severity. We examined the association of sex, race, and ethnicity with ED visits for diverticulitis and diverticular bleeding, according to disease severity, in the United States.

Patients who presented to the ED with diverticular disease were identified using International Classification of Diseases (ICD) codes from the 2019 Nationwide Emergency Department Sample (NEDS), the largest all-payer ED database in the United States.⁵ NEDS includes information from the ED visit and the subsequent inpatient hospitalization if the patient is admitted. Procedures indicative of disease severity were identified with ICD and Current Procedural Terminology codes, including red blood cell

(RBC) transfusions and abdominal procedures associated with management of severe disease (eg, colectomy, lavage, and drainage). Complicated diverticulitis was defined by the presence of either a diagnosis code with mention of abscess/perforation or an abdominal procedure. Severe diverticular bleeding was defined by the receipt of an RBC transfusion. NEDS documents self-reported race and ethnicity. Age-adjusted prevalence was estimated with population distributions from the US Census Bureau. Multivariate weighted logistic regressions were employed to analyze demographic differences in diverticular disease severity and admission rate with adjustments for demographics, socioeconomic factors, and Charlson Comorbidity Index.

In 2019, there were 612,035 ED visits for diverticular disease in the United States, including 487,569 visits for diverticulitis and 83,191 visits for diverticular bleeding (Table A1). Among these visits, 178,938 (36.7%) diverticulitis patients and 75,620 (90.9%) diverticular bleeding patients were admitted. For diverticular disease overall, mortality was low (0.2%), average length of stay was 4.34 days, and average inpatient cost was \$4595.4 US dollars (Table A2).

Overall diverticulitis prevalence was higher in women (228.0/100,000 population) compared to that in men (118.0) (Figure A), particularly in patients aged more than 40 years (Figure A1A). Among women, prevalence was highest in Whites (312.3) followed by Blacks (296.9) and Hispanics (244.3). Among men, prevalence was highest in Hispanics (187.6) and similar in Blacks (120.3) and Whites (117.3). Among diverticulitis patients, women had lower odds having complicated disease (odds ratio = 0.67; 95% confidence interval = 0.65–0.69) and lower odds of admission (0.88; 0.85–0.90) compared to men. Blacks, Hispanics, and Asians/Pacific Islanders had lower odds of having complicated disease compared

to Whites in both sexes (Figure B). Blacks had lower odds for admission in both sexes while Hispanics and Asian/Pacific Islanders had lower odds of admission among men (Figure C).

Overall diverticular bleeding prevalence was also higher in women (34.2) compared to that in men (23.7) (Figure C), particularly in patients aged more than 40 years (Figure A1B). Prevalence was highest in both Black men (53.9) and women (71.5) compared to other race/ethnicities. There was no significant difference in diverticular bleeding severity between women and men (0.94; 0.88–1.02), but women had lower odds for admission (0.88; 0.80–0.97). Blacks, Hispanics, and Asian/Pacific Islanders had higher odds of receiving RBC transfusions compared to White patients (Figure D). Asian/Pacific Islanders had higher odds of admission for both sexes, while Blacks had higher odds of admission among men (Figure F).

In this study, we showed that diverticular disease prevalence and severity differs by sex and race/ethnicity in ED visits in the United States. Our observation of increased diverticular disease prevalence in women compared to men in the ED setting is consistent with the findings from Wheat et al among inpatients,³ and with findings from Bollom et al from the 2013 NEDS.⁴ In age-stratified analyses, we found that prevalence of both diverticulitis and diverticular bleed was higher in men before age 40 years and higher in women after age 40 years. A prior study of diverticulitis epidemiology from 1980 to 2007 showed a trend shift in sex differences around age 50–59 years.⁶ The younger trend shift in our study may reflect increasing prevalence of diverticular disease in younger patients.^{3,4} Although the pathophysiology for these sex differences are unknown, possible explanations include sex differences in lifestyle and environmental factors associated with diverticulitis, including obesity, physical activity, and menopause.^{3,7,8} Despite a higher

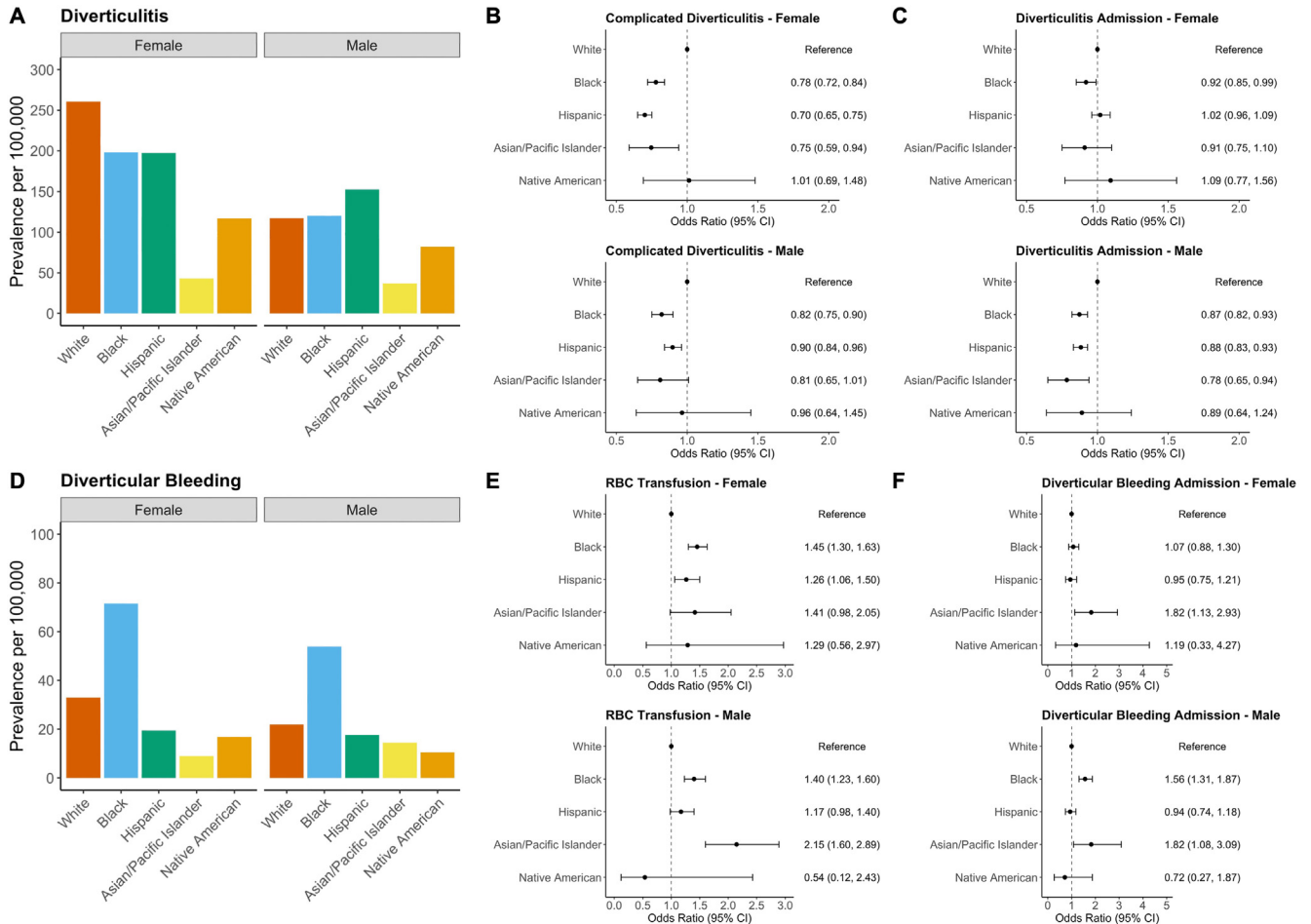


Figure. (A) Age-adjusted prevalence per 100,000 population for diverticulitis stratified by sex and race/ethnicity. (B) Multivariate regression analyses for complicated vs uncomplicated diverticulitis. (C) Multivariate regression analyses for inpatient admission among patients presenting with diverticulitis. (D) Age-adjusted prevalence per 100,000 population for diverticular bleeding stratified by sex and race/ethnicity. (E) Multivariate regression analyses for red blood cell (RBC) transfusion among patients presenting with diverticular bleeding. (F) Multivariate regression analyses for inpatient admission among patients presenting with diverticular bleeding. Regression models were adjusted for age, sex, Charlson Comorbidity Index, geographic location, hospital urban-rural and teaching status, income quartile, and insurance. Points indicate odds ratio (OR) and error bars indicate 95% confidence intervals (CI).

prevalence of diverticulitis in women, women had lower odds of complications and admissions compared to men. A pooled analysis of 1840 diverticulitis patients also showed a nonsignificant but lower risk of complicated diverticulitis in women.⁹ Further research is needed to elucidate the underlying cause for these observed sex differences.

Within inpatient settings, diverticulitis prevalence has been observed to be highest in White patients, while diverticular bleeding prevalence is highest in Black patients.³ Our study observed similar patterns in the ED setting. A possible explanation could be differences in the prevalence of diverticula location: Whites have

higher prevalence of distal diverticula, which are at higher risk for diverticulitis, while Blacks have higher prevalence of proximal diverticula, which are at higher risk for hemorrhage.⁷ Other risk factors for diverticular bleeding include hypertension, diabetes, and vascular disease, which are more prevalent in Black patients.⁷ After sex stratification, we observed that White women and Hispanic men had the highest prevalence of diverticulitis. Notably, rates of obesity have risen rapidly in Hispanic men in the United States over the past 2 decades,¹⁰ which may be contributing to the increase in diverticulitis in this population.

We observed that Black, Hispanic, and Asian/Pacific Islander patients

were less likely to have complicated diverticulitis or be admitted for diverticulitis compared to White patients. However, non-White patients were more likely to require RBC transfusion or admission for diverticular bleeding. While a prior inpatient study also found that non-White patients with diverticulitis were less likely to have complicated disease,¹¹ a recent prospective study found that Black patients were less likely to receive RBC transfusions at similar hemoglobin levels compared to White patients.¹² Nonetheless, studies on race/ethnicity and diverticular disease severity have been limited. Therefore, further research is needed to corroborate these findings.

There are several limitations of this study. First, we used ICD and Current Procedural Terminology codes to identify patients with diverticular disease and to assess disease severity, which may have introduced misclassification. For example, patients may receive RBC transfusion for baseline anemia, which may not correlate with disease severity. Additionally, a diagnosis of diverticular bleeding is unreliable in patients who are discharged from the ED and never receive a colonoscopy or other advanced imaging. Reassuringly, the majority (90.9%) of diverticular bleeding patients in our study were admitted. Second, NEDS only provides encounter-level data and not patient-level data. Third, race and ethnicity data were only available in NEDS starting in 2019 and sample size was limited for some patient populations, especially Native Americans. Finally, our findings of differences in diverticular disease severity by sex and race/ethnicity may also be in part due to differences in diagnosis coding, insurance, outpatient treatment, or transfusion guideline adherence.^{11,12}

In summary, diverticular disease prevalence is higher in women than in men, but women are less likely to have complicated disease. Among men, diverticulitis prevalence is highest in Hispanics and among women, prevalence was highest among Whites. Diverticular bleeding prevalence was highest in both Black men and women. Non-White patients had lower odds of complicated diverticulitis, but higher odds of receiving an RBC transfusion for diverticular bleeding. Our findings call for greater awareness and further investigation of underlying causes for the sex and race/ethnicity differences in diverticular disease.

NEIL S. ZHENG¹
WENJIE MA^{2,3}
DENNIS L. SHUNG¹
LISA L. STRATE⁴
ANDREW T. CHAN^{2,3,5}

¹Yale School of Medicine, Yale University, New Haven, Connecticut

²Clinical and Translational Epidemiology Unit, Massachusetts General Hospital and Harvard Medical School, Boston, Massachusetts

³Division of Gastroenterology, Massachusetts General Hospital and Harvard Medical School, Boston, Massachusetts

⁴Division of Gastroenterology, University of Washington School of Medicine, Seattle, Washington

⁵Department of Epidemiology, Harvard T.H. Chan School of Public Health, Boston, Massachusetts

Correspondence:

Address correspondence to: Andrew T. Chan, MD, MPH, Clinical and Translational Epidemiology Unit, Massachusetts General Hospital, 100 Cambridge St, Boston, Massachusetts 02114. e-mail: achan@mgh.harvard.edu.

Supplementary Materials

Material associated with this article can be found in the online version at <https://doi.org/10.1016/j.gastha.2023.11.012>.

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Abbreviations used in this paper: CPT, Current Procedural Terminology; ED, emergency department; GI, gastrointestinal; ICD, International Classification of Diseases; NEDS, National Emergency Department Sample; RBC, red blood cell

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Conflicts of Interest:

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Ethical Statement:

Based on the Healthcare Cost and Utilization Project (HCUP) data use agreement, section 8) (https://hcup-us.ahrq.gov/DUA/dua_508/DUA508_version.jsp), HCUP databases conform to the definition of a limited dataset. A limited dataset is healthcare data in which 16 direct identifiers, specified in the Privacy Rule, have been removed. Under HIPAA, review by an institutional review board is not required for use of limited datasets.

Data Transparency Statement:

Due to the Healthcare Cost and Utilization Project's Nationwide Database Data Use Agreement, the data are unavailable publicly. Specific requests will be considered by authors that abide fully with the data agreement.

Reporting Guidelines:

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