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ORIGINAL ARTICLE

Racial and Ethnic Differences in Health Care Utilization and Outcomes Among Ulcerative Colitis Patients in an Integrated Health-Care Organization

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Abstract
Background Current knowledge of racial disparities in healthcare utilization and disease outcomes for ulcerative colitis (UC) is limited. We sought to investigate these differences among Caucasian, African American, Asian, and Hispanic patients with ulcerative colitis in Kaiser Permanente, a large integrated health-care system in Northern California.
Methods This retrospective cohort study used computerized clinical data from 5,196 Caucasians, 387 African–Americans, 550 Asians, and 801 Hispanics with prevalent UC identified between 1996 and 2007. Healthcare utilization and outcomes were compared at one and five-year follow-up by use of multivariate logistic regression analysis.
Results Compared with whites, the male-to-female ratio differed for African–Americans (0.68 vs. 0.91, $p < 0.01$) and Asians (1.3 vs. 0.91, $p < 0.01$). Asians had fewer comorbid conditions ($p < 0.01$) than whites, whereas more African–Americans had hypertension and asthma ($p < 0.01$). Use of immunomodulators did not differ significantly among race and/or ethnic groups. Among Asians, 5-ASA use was highest ($p < 0.05$) and the incidence of surgery was lowest ($p < 0.01$). Prolonged steroid exposure was more common among Hispanics ($p < 0.05$ at 1-year) who also had more UC-related surgery ($p < 0.01$ at 5-year) and hospitalization (<0.05 at 5-year), although these differences were not significant in multivariate analysis.
Conclusions In this population of UC patients with good access to care, overall health-care utilization patterns and clinical outcomes were similar across races and ethnicity. Asians may have milder disease than other races whereas Hispanics had a trend toward more aggressive disease,

The findings and conclusions in this paper are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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although the differences we observed were modest. These differences may be related to biological factors or different treatment preferences.

Keywords Ulcerative colitis · Health services research · Computerized medical information · Outcomes research · Race and/or ethnic differences

Abbreviations

IBD	Inflammatory bowel disease
UC	Ulcerative colitis
5-ASA	5-Aminosalicylate
COPD	Chronic obstructive pulmonary disease
OR	Odds ratio
CI	Confidence interval

Introduction

Clinical outcomes of ulcerative colitis (UC) are affected by biological susceptibility, socioeconomic and cultural factors, for example comorbidity, care-seeking behavior, understanding of and adherence to treatment, and access to care [1]. Race and/or ethnicity-specific differences in disease behavior and clinical outcomes may reflect these factors and may serve as a target for improvement of care. Our current knowledge of UC has been derived largely from predominantly Caucasian cohorts. Consequently, care strategies derived from these studies may be suboptimum for care of non-Caucasian patients. To date, information about disease behavior and outcomes for African–Americans with UC remains very limited [2–4]. Most studies on Asians and Hispanics were conducted in Asia and Puerto Rico, respectively [4–8], which may not reflect clinical behavior and outcomes for Asian and Hispanic patients with UC in the US.

Limitations in previous studies addressing racial and/or ethnic differences in UC include small sample size, limited follow-up time, heterogeneity of patients' insurance coverage and socioeconomic status, and disparities in access to care. In this regard, an integrated healthcare system with a well-defined patient population and minimum discrepancy in access to care, such as exists at Kaiser Permanente, is a unique advantage when studying racial and/or ethnic differences in UC. In this study we sought to elucidate racial differences in health-care utilization and clinical outcomes among Caucasian, African–American, Asian, and Hispanic patients with UC in the hope of furnishing information for care givers and prompting the development of intervention that could address the specific needs of patient subgroups.

Methods

Setting

This study was conducted using the community-based inflammatory bowel disease (IBD) registry at the Kaiser Permanente Medical Care Program. This program provides comprehensive and integrated care for 3.2 million members of the population of Northern California, which accounts for approximately one-third of the population of the area. Unlike most other health care programs in the US, care at Kaiser Permanente is prepaid, and is delivered within a closed system without intermediating insurance companies.

Compared with persons living in the Kaiser service area who are covered by other medical insurers, members of Kaiser Permanente are more racially diverse (non-white 43 vs. 34 %), have lower mean income ($72, 922 vs. $79, 816), have lower college attainment (41 vs. 45 %), are more obese (21 vs. 19 %), and have similar smoking habits (13 vs. 14 %) [9].

Study Design and Study Population

We performed a retrospective cohort study of patients with UC. Methods used for case ascertainment have been described elsewhere [9]. Briefly, we required two or more International Classification of Diseases, Ninth Edition (ICD-9) codes for UC (ICD-9 code 556) and absence of any code for Crohn's disease (code 555) in our computerized clinical data system. Patients older than 89 years were excluded from the study. The date of the second diagnosis was used as the baseline date, and because we measured outcomes at one and five years post baseline, we required at least one year of continuous enrollment in the program after the second diagnosis.

Data Collection

Race and/or Ethnicity

Information on race and/or ethnicity was obtained from the health plan's satisfaction surveys, two large-scale self-administered surveys, mortality data, and hospitalization data, with self-reported information given precedence over provider-recorded information.

Healthcare Utilization and Clinical Outcomes

The percentage of patients experiencing outcomes was computed at the end of year one and year five after baseline, and included only those patients for whom full one or five years of observation was achieved. Outcomes included emergency room visits with UC as the primary diagnosis,

colonoscopy or sigmoidoscopy, gastroenterology clinic visits with UC as the primary diagnosis, IBD-related medication use (5-aminosalicylic acid, corticosteroid, immunomodulators (including mercaptopurine and azathioprine), and infliximab), prolonged steroid exposure (defined as continuous use of steroids for $\geq$120 days, allowing as much as a 14-day gap), hospitalization with UC as the primary diagnosis, and surgical treatment for UC. The definition of surgery in this study included total or partial colectomy (with or without ostomy), small bowel resection, and surgery for abscess or fistula. This information was collected from pharmacy data, hospitalization data, and outpatient diagnosis data from Kaiser Permanente's computerized clinical information systems.

Potential Confounding or Modifying Factors

Demographics (age and gender) were obtained from the health plan's membership data. The Charlson comorbidity index was computed by use of data from the year after baseline. We also collected information on specific comorbid conditions (asthma, chronic obstructive pulmonary disease (COPD), diabetes, and hypertension). Smoking history (never, former, current, or unknown) was recorded by the primary care provider at the time of routine clinic visits. Socioeconomic status at baseline (mean and median annual incomes and percentage of subjects with at least high school education) was obtained from census block averages. Mean out-of-pocket payment was the total payment the patient incurred for medications and outpatient visits.

Statistical Analysis

Proportions of patients who experienced outcomes one and five years after baseline were computed. Multivariate logistic regression analysis was performed to examine racial differences in health-care utilization and outcomes with adjustment for potential confounders. The independent variables for which we adjusted included age at index date (continuous variable), Charlson co-morbidity index (continuous), blockgroup income (continuous), corticosteroid exposure at one or five-year follow up (no, yes), and history of previous hospitalization for IBD (no, yes).

The study was approved by the Kaiser Foundation Research Institute Institutional Review Board.

Results

Study Population Characteristics

Between 1996 and 2007, a total of 10,838 cases of UC were identified. After excluding individuals with indeterminate colitis, age older than 90 years, unknown gender, mixed race, or unknown race, a total of 6,934 subjects were included in the study (Fig. 1). The study population included 5,196 whites, 387 African–Americans, 550 Asians, and 801 Hispanics. Characteristics of the patients are shown in Table 1. Compared with whites (male-to-female ratio = 0.91) and Hispanics (0.95), more African–Americans were female (0.68) and more Asians were male (1.34). Overall, Hispanic (45.4 $\pm$ 16.5 years), Asian (45.2 $\pm$ 15.5 years) and African–American (48.2 $\pm$ 16.1 years) patients were younger than white patients (51.1 $\pm$ 17.3 years). The prevalence of COPD was lower among Asians (6.6 %) and Hispanics (9.1 %) than among whites (12.6 %) and African–Americans (16.3 %). The prevalence of diabetes and hypertension was higher among African–Americans (10.3 and 34.9 %, respectively) and lower among Asians (5.1 and 16.9 %) than among whites (7.0 and 23.4 %), with Hispanics being somewhat mixed (diabetes, 10.1 %; hypertension, 21.6 %). Asthma was more common among African–Americans (9.6 %) and less common among Asians (5.6 %) than among whites (8.0 %). Overall, the Charlson co-morbidity index $\geq$1 was lower for Asians (18.2 %) than for whites (26.2 %), African–Americans (32.8 %), and Hispanics (25.6 %). Compared with white patients, African–American and Hispanic patients had lower median annual incomes ($54,219 and $59,975 vs. $65,174, respectively) whereas Asians had a higher median annual income ($70,089). The percentage of patients with at least a high school education differed also: Hispanics (80.4 %), African–Americans (80.7 %), Asians (86.3 %), and whites (87.9 %). Mean annual out-of-pocket payment was lower for African–American patients than for other races ($72.6 vs. $88.3–$106.4) and the ratio of mean out-of-pocket payment to median annual income was similar for whites, Hispanics, and Asians, and lower for African–Americans, but the differences were not statistically significant.

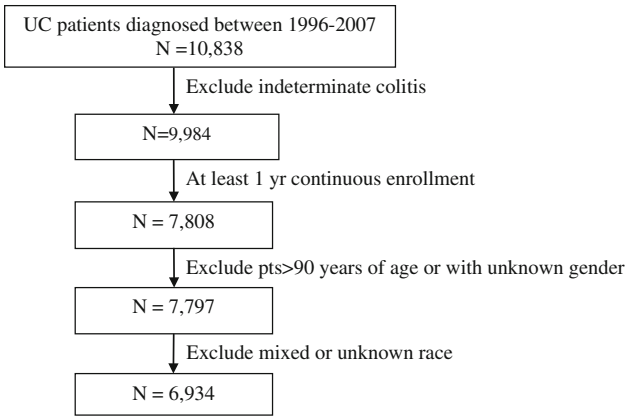

Fig. 1 Flow diagram of patient selection

Table 1 Characteristics of prevalent UC patients at baseline, Kaiser Permanente, Northern California, 1996–2007

Characteristic	Racial distribution (n = 6,934)			
	White (n = 5,196) %	African–American (n = 387) %	Asian (n = 550) %	Hispanic (n = 801) %
Gender				
Female	52.3	59.7**	42.7**	51.2
Age, years				
0–18	3.5	3.6	3.6	4.5
19–39	21.1	25.6	31.5**	32.1**
40–59	41.9	44.2	45.3	41.8
>60	33.5	26.6*	19.6**	21.6**
Mean age (SD), years	51.1 (17.3)	48.2 (16.1)**	45.2 (15.5)**	45.4 (16.5)**
Co-morbid conditions				
None	73.9	67.2	81.8	74.4
Asthma	8.0	9.6**	5.6**	6.0
COPD	12.6	16.3*	6.6**	9.1**
Diabetes	7.0	10.3*	5.1	10.1**
Hypertension	23.4	34.9**	16.9**	21.6
Charlson co-morbidity index[a]				
0	73.8	67.2	81.8	74.4
1 or more	26.2	32.8**	18.2**	25.6
Smoking status				
Former	18.0	18.1	13.6	17.5
Never	72.2	71.6	78.4**	72.9
Current	5.3	7.2	2.6	5.2
Unknown	4.5	3.6	5.5*	4.4
Blockgroup socioeconomic status				
Mean income (SD)	$67,515 ($25,605)	$56,598 ($22,558)**	$74,445 ($29,171)**	$61,009 ($22,477)**
Median income	$65,174	$54,219	$70,089	$59,975
Mean out-of-pocket payment[a]	$103.7	$72.6*	$106.4	$88.3
Ratio of mean out-of-pocket payment to median income	0.159 %	0.134 %	0.152 %	0.147 %
High school education (mean %, SD)	87.9 (9.7)	80.7 (13.8) **	86.3 (10.9)**	80.4 (14.2)**

[a] In the year after the second diagnosis recorded in the computerized clinical data

*$p < 0.05$ compared with whites

**$p < 0.01$ compared with whites

Gastroenterology Clinic and Emergency Room Visits and Endoscopic Evaluation

The percentage of patients who visited the emergency room with UC as primary diagnosis was similar (2.6–2.9 %) for whites, Asians, and Hispanics, and higher for African–Americans (5.7 %, $p < 0.05$) at one-year follow-up (Table 2). A relatively high proportion of non-whites had emergency room visits at five-year follow-up (7.5–8.9 vs. 5.3 % for whites), but this difference was not statistically significant. The proportion of patients who visited the gastroenterology clinic with UC as primary diagnosis did not differ across the race and/or ethnic groups at one-year (64–70 %) or five-year (83–88 %) follow-up. At one-year follow-up, between 42–44 % of patients underwent colonoscopic or sigmoidoscopic evaluation. The percentages increased to 69–75 % at five-year follow-up and did not differ among the racial and/or ethnic groups.

Medication Use

At one-year follow-up, more Asians used 5-ASA than did other racial groups (69 vs. 61–63 %, $p < 0.01$). The proportion of patients exposed to corticosteroid, immunomodulators, or infliximab was similar overall among all the race and/or ethnic groups. A higher proportion of Asians

Table 2 Healthcare utilization and clinical outcomes for UC patients by racial and/or ethnic group, after one and five years

Therapy	One year after baseline				Five years after baseline			
	White (n = 5,196) %	African–American (n = 387) %	Asian (n = 550) %	Hispanic (n = 801) %	White (n = 2,302) %	African–American (n = 180) %	Asian (n = 226) %	Hispanic (n = 358) %
Gastroenterology clinic visit for UC								
% of patients	63.7	68.0	69.8	67.2	82.5	86.1	88.1	84.1
Emergency room visits for UC								
% of patients	2.7	5.7*	2.6	2.9	5.3	8.3	8.9	7.5
Colonoscopy or sigmoidoscopy								
% of patients	42.2	41.6	44.2	42.5	74.3	69.4	74.8	71.5
Medication use								
5-ASA								
% ever used	61.8	63.3	69.3**	61.2	76.2	80.6	84.5*	75.7
Oral steroids								
% ever used	16.2	17.3	16.7	18.5	32.4	33.3	34.5	33.0
Immunomodulators								
% ever used	4.6	4.4	4.4	4.2	7.0	6.7	9.7	8.1
Infliximab								
% ever used	0.4	0.8	0.2	0.4	0.9	0.6	1.3	0.6
Number of IBD-related medication classes								
0	34.9	33.6	28.7	34.8	19.9	16.7	13.3	19.3
1	49.3	49.6	54.6**	48.6	49.6	51.1	51.8	50.6
2+	15.8	16.8	16.7	16.6	30.5	32.2	35.0	30.2
Duration of medication use among users (months)								
5-ASA	8.5	7.3**	8.5	7.6**	31.3	24.6**	33.3	25.8**
Oral corticosteroid	4.7	4.4	3.9*	4.5	8.1	8.7	9.0	9.2
Immunomodulators	8.5	7.8	9.3	8.1	27.0	24.0	25.0	26.5
Infliximab	8.9	5.7	4.0	7.0	18.9	60.0	5.0**	13.0
Prolonged steroid exposure								
% of patients	5.3	4.1	4.2	6.5*	10.6	9.4	15.0	12.9
Hospitalization with UC as primary diagnosis								
% of patients	8.1	9.8	6.6	9.4	16.0	16.7	19.0	23.2*
Surgery (%)								
% of patients	5.4	3.4	2.0*	4.7	11.5	9.4	5.3**	14.3**

The baseline date was the date of second diagnosis recorded in the computerized clinical data

*$p < 0.05$ compared with whites

**$p < 0.01$compared with whites

received IBD-related medications than other groups (71 vs. 65–66 %). Among users, duration of 5-ASA use was shorter among African–Americans (seven months) and Hispanics (eight months) than among whites and Asians (nine months) ($p < 0.01$). Among users, the average duration of corticosteroid (4–5 months), immunomodulator (8–9 months), and infliximab (4–9 months) use was similar among all the race and/or ethnic groups, although duration of steroid use was shortest for Asians. Multivariate analysis revealed a higher percentage of 5-ASA use among Asians than among whites (adjusted OR = 1.3, 95 % CI 1.1–1.6) (Table 3). The proportion of patients with prolonged steroid exposure was similar among whites, African–Americans, and Asians, and was higher among Hispanics in univariate analysis (6.5 vs. 5 % in whites, $p < 0.05$) (Table 2) but not in multivariate analysis (Table 3).

At five-year follow up, more Asians used 5-ASA than did other races (85 vs. 76–81 %, $p < 0.05$). Use of corticosteroids (32–35 %), immunomodulators (7–10 %), or infliximab (0.6–1.3 %) at any time was no different across the races. African–Americans and Hispanics had shorter durations of 5-ASA use compared with whites (25 months

Table 3 Multivariate analysis of healthcare utilization and clinical outcomes of UC patients by racial and/or ethnic group at one-year and five-year follow-up

Characteristic	One year after baseline				Five years after baseline			
	White (n = 5,196) %	African–American (n = 387) %	Asian (n = 550) %	Hispanic (n = 801) %	White (n = 2,302) %	African–American (n = 180) %	Asian (n = 226) %	Hispanic (n = 358) %
Medication use								
5-ASA								
AOR (95 % CI)	Ref	1.1 (0.9–1.4)	1.3 (1.1–1.6)**	0.9 (0.8–1.1)	Ref	1.3 (0.9–2.0)	1.5 (1.0–2.2)	0.9 (0.7–1.3)
Oral steroids	Ref	0.9 (0.7–1.2)	1.0 (0.8–1.3)	1.01 (0.8–1.3)	Ref	0.9 (0.6–1.3)	1.0 (0.8–1.4)	0.9 (0.7–1.1)
AOR (95 % CI)								
Prolonged steroid exposure								
AOR (95 % CI)	Ref	0.7 (0.4–1.2)	0.8 (0.5–1.2)	1.2 (0.8–1.6)	Ref	0.8 (0.5—1.3)	1.5 (1.0–2.2)	1.1 (0.7–1.5)
Hospitalization with UC as primary diagnosis								
AOR (95 % CI)	Ref	0.8 (0.5–1.4)	0.7 (0.4–1.0)	1.0 (0.7–1.4)	Ref	0.9 (0.6–1.6)	1.0 (0.7–1.6)	1.2 (0.8–1.7)
Surgery (%)								
AOR (95 % CI)	Ref	0.5 (0.3–1.0)	0.3 (0.2–0.7)*	0.8 (0.6–1.2)	Ref	0.9 (0.5–1.5)	0.4 (0.2–0.8)**	1.2 (0.9–1.7)

The baseline date was the date of second diagnosis recorded in the computerized clinical data

AOR adjusted OR—adjusted for age at baseline (continuous), Charlson comorbidity index (0, 1, 2+), income (blockgroup, continuous), oral corticosteroid exposures (none vs. any recorded), and prior hospitalization for IBD (none vs. any recorded)

*$p < 0.05$ compared with whites

**$p < 0.01$ compared with whites

and 26 months, vs. 31 months, respectively; $p < 0.01$), whereas Asians had a longer duration (33 vs. 31 months for whites) although the difference was not statistically significant. The duration of immunomodulator treatment was similar across the races. A higher proportion of Asians had prolonged steroid exposure compared with whites (15 vs. 11 %) but this was not statistically significant. Asians had the shortest duration of infliximab use and African–Americans had the longest, but the overall number of patients exposed to infliximab was small.

Hospitalization and Surgery

At one-year follow-up, 7–10 % of patients were hospitalized with UC as primary diagnosis, with no differences across the race and/or ethnic groups (Table 2). At five-year follow-up, the proportion of Hispanic patients with UC-related hospital admission was significantly higher than for whites in univariate analysis (23 vs. 16 %, $p < 0.01$ %) (Table 2). In multivariate analysis, this difference was not statistically significant (adjusted OR = 1.2, CI 0.8–1.7) (Table 3).

The proportion of patients who required surgery during one-year follow-up was small among all racial groups, with incidence of surgery being lowest for Asians. At five-year follow-up, a lower percentage of Asians and a higher percentage of Hispanics underwent surgery compared with whites (5 vs. 12 %, and 14 vs. 12 %, respectively; $p < 0.01$) (Table 2). In multivariate analysis, fewer Asians underwent surgery compared with whites at one-year follow-up (adjusted OR = 0.3; $p < 0.05$). African–Americans had a trend toward lower incidence of surgery compared with whites. At five-year follow-up, incidence of surgery continued to be lowest for Asians (adjusted OR 0.4 compared with whites, $p < 0.01$), with no significant differences detected among other races (Table 3).

Discussion

We studied the differences in healthcare utilization and clinical outcomes among 5,196 Caucasians, 387 African–Americans, 550 Asians, and 801 Hispanics with UC during the period 1996–2007 within the Kaiser Permanente Medical Care Program. This is currently the largest dataset for African–American and Hispanic UC patients in the US, and the largest data set for Asians with UC outside Asia [5, 10, 11]. Another unique strength of our study is its setting in community practice, in contrast to many previous studies based on tertiary care centers. An additional strength is that all persons in the study had similar access to care, so access-to-care issues had a minimum effect on the results, enabling us to focus the study on other possible predictors of outcomes.

Knowledge about racial differences in therapeutic regimens for UC is limited. Overall, medication use, including

5-ASA, corticosteroid, immunomodulators, and infliximab, were similar across the race and/or ethnic groups. 5-ASA use was higher for Asians at both one and five-year follow-up. Asians also had the shortest duration of infliximab exposure at five years and the lowest incidence of surgery among all the racial groups at both one and five years. These findings are in accord with previous studies indicating that Asians tend to have milder disease than whites [12–14]. However, we also observed a trend toward more prolonged steroid exposure, a marker of aggressive disease, at five years among Asians. An alternative explanation is patient preference for treatment options. Asians may prefer non-surgical therapy. They may also prefer traditional medical regimens to biological agents, given the potential risks associated with anti-TNF agents.

In univariate analysis we observed that prevalence of prolonged steroid exposure at one-year follow-up was higher for Hispanics than for other races. UC-related hospitalization and surgery after five years were also greater for Hispanics in univariate analysis. Nguyen et al. [4] also reported more extensive disease and greater incidence of surgery among Hispanics, although the Hispanic patients in that study resided in Puerto Rico. Interestingly, use of 5-ASA and immunosuppressive medications was similar for Hispanics and other racial groups. Although we do not have a definitive explanation, the discrepancies observed for Hispanics may be secondary to several factors, for example disease severity, treatment preferences, and compliance with maintenance medication. It is possible that Hispanic patients are, overall, less likely to stay on maintenance medication including 5-ASA and immunomodulators. This is an important topic for further investigation.

We observed that more African–Americans than whites visited the emergency department at one-year follow-up, but African–Americans had a trend toward less surgery (Table 3). African–Americans also had a shorter duration of 5-ASA use. These differences may reflect treatment preferences or different disease activity. Our findings showed similar percentages of African–Americans and whites received steroids, immunomodulators, or infliximab. This is different from the findings of Flasar et al. [3] that African–Americans were less likely than whites to receive steroids (56 vs. 68 %, $p = 0.02$), immunomodulators (28 vs. 40 %, $p = 0.03$), and infliximab (10 vs. 20 %, $p = 0.03$). In that study, the population was much more heterogeneous, including patients referred to a tertiary care center in Baltimore from surrounding counties and a Veterans Affairs (VA) gastroenterology clinic which covered Baltimore and 18 neighboring counties. In that setting, discrepancies in access to care might be a confounder. This factor was essentially eliminated in our study because of the pre-paid care within Kaiser Permanente's system.

Our findings that African–Americans had a trend toward lower incidence of surgery compared with whites is consistent with the study by Nguyen et al. [15] which showed that incidence of colectomy was lower for African–Americans and Hispanics than for whites (rate ratios 0.46 and 0.74, respectively), although in our study the incidence of surgery at 5 years was higher for Hispanics. The Nguyen et al. study analyzed discharge records from the National Inpatient Sample. The two studies are difficult to compare because all the patients in Nguyen's study were hospitalized, indicating more severe disease, whereas only a small proportion of our patients were hospitalized. In addition, patients in the Nguyen study had a variety of coverage plans including private, Medicare, Medicaid, and self-pay, whereas in our study all the patients were insured with pre-paid coverage. Therefore, apart from possible biological factors and patient and/or physician treatment preferences, the different access to care could also have contributed to the different findings.

In our population the use of immunosuppressive agents was relatively low. This may reflect milder disease in the community setting. We have validated our algorithm for ascertaining UC, with the positive predictive value being 95 % [16]. Overall, academic centers tend to over-represent severe diseases because a significant proportion of the patients are referred cases with more severe and complex ailments. This has been reported in Canada and Europe [17–19]. Patient and physician treatment preferences, patient compliance, and other undefined factors may also be involved [20].

Several limitations affect interpretation of our study. First, our study did not include the uninsured population or patients who received health care in a fee-for-service or non-integrated setting. To this end, data generated from this study and from other healthcare settings are complementary. Second, we were unable to ascertain the history of our patients before their becoming Kaiser Permanente members, and before the study started in 1996. Therefore, we could not evaluate the effect of the patients' previous disease severity on their clinical history and response to treatment during the follow-up period. Third, our cohort was a prevalence cohort rather than an inception cohort. To address this limitation, we conducted a separate analysis using a three-year wash-out period in which all patients with a diagnosis of UC within three years of membership enrollment were excluded. The findings from this sensitivity analysis were very similar to the results tabulated for this report and did not change our findings and conclusions. Fourth, we used census block averages as a marker for personal income. Although this method does not reflect possible variations in socioeconomic status and income within each census block, it is a good approximation and is the only feasible method available to us for assessing this

variable. Fifth, use of infliximab could have been underestimated in this study because infliximab was approved by the Food and Drug Administration for treatment of UC in 2005 and the follow-up in this study ended in 2007. This factor limited our ability to compare utilization of infliximab for UC treatment across racial and/or ethnical groups.

In conclusion, our study demonstrated several differences in healthcare utilization and clinical outcomes among patients with UC across racial groups. The findings reflect some racial differences in UC when discrepancies in access to care were minimal. The patterns of healthcare utilization and clinical outcomes overall were similar. Asians may have milder disease whereas UC in Hispanics may have been more aggressive, although the differences we observed were modest. Biological factors, different treatment preferences, language, and cultural barriers may affect care processes and outcomes. Future prospective studies are needed to identify specific causes that could be targeted to reduce variability in treatment and outcomes among different racial and ethnic groups. Improved understanding of racial and ethnic differences in UC will lead to personalized strategies in disease management.

Conflict of interest None.

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