Racial Differences in the Receipt of Bowel Surveillance Following Potentially Curative Colorectal Cancer Surgery

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Objective. To investigate racial differences in posttreatment bowel surveillance after colorectal cancer surgery in a large population of Medicare patients.

Data Sources. We used a large population-based dataset: Surveillance, Epidemiology, and End Results (SEER) linked to Medicare data.

Study Design. This is a retrospective cohort study. We analyzed data from 44,768 non-Hispanic white, 2,921 black, and 4,416 patients from other racial/ethnic groups, aged 65 and older at diagnosis, who had a diagnosis of local or regional colorectal cancer between 1986 and 1996, and were followed through December 31, 1998. Cox Proportional Hazards models were used to investigate the relation of race and receipt of posttreatment bowel surveillance.

Data Collection. Sociodemographic, hospital, and clinical characteristics were collected at the time of diagnosis for all members of the cohort. Surgery and bowel surveillance with colonoscopy, sigmoidoscopy, and barium enema were obtained from Medicare claims using ICD-9-CM and CPT-4 codes.

Principal Findings. The chance of surveillance within 18 months of surgery was 57 percent, 48 percent, and 45 percent for non-Hispanic whites, blacks, and others, respectively. After adjusting for sociodemographic, hospital, and clinical characteristics, blacks were 25 percent less likely than whites to receive surveillance if diagnosed between 1991 and 1996 (RR = 0.75, 95 percent CI = 0.70–0.81).

Conclusions. Elderly blacks were less likely than non-Hispanic whites to receive posttreatment bowel surveillance and this result was not explained by measured racial differences in sociodemographic, hospital, and clinical characteristics. More research is needed to explore the influences of patient- and provider-level factors on racial differences in posttreatment bowel surveillance.

Key Words. Colorectal neoplasms, SEER-Medicare, colonoscopy, blacks, surveillance

Colorectal cancer is the second leading cause of cancer mortality in the United States and is estimated to account for 56,600 deaths in 2002 (Jemal et al. 2002). Important racial and ethnic differences exist in colorectal cancer incidence and mortality. While U.S. blacks have a 12 percent higher incidence rate than

U.S. whites, the black mortality rate is 36 percent higher (Ries et al. 2002). Incidence and mortality rates for members of other racial/ethnic groups are similar to or lower than those of U.S. whites. Moreover, survival following potentially curative treatment is often worse for blacks than for whites regardless of socioeconomic status, tumor, or treatment characteristics (Mayberry et al. 1995; Cooper et al. 1996).

Most newly diagnosed colorectal cancer cases will have surgery with curative intent (Decosse, Tsioulis, and Jacobson 1994; Rosen et al. 1998). Patients receiving surgery after an initial diagnosis of colorectal cancer are at increased risk of recurrence and metachronous tumors. The risk of recurrence increases substantially with increasing stage of disease. Consequently, recurrence occurs in 35 to 40 percent of patients presented with stage II or III disease; most recurrences occur within three years after primary surgery (Desch et al. 1999). Metachronous or second primary tumors occur at a rate of 0.35 percent per year (Virgo et al. 1995), and the risk is higher among younger (<65 years) than among older age groups (Shureiqi et al. 2001).

Because patients receiving potentially curative colorectal cancer surgery are at risk of recurrence and increased risk of developing second primary tumors, posttreatment bowel surveillance is recommended to detect these tumors at earlier and more curable stages. Based on the best available evidence regarding posttreatment surveillance, professional societies have established guidelines to aid clinicians in treating these high-risk patients. Clinical guidelines vary with regard to intensity and frequency of posttreatment surveillance, but most suggest initial posttreatment surveillance with colonoscopy or barium enema within one year of surgery with curative intent and at three to five years following the initial surveillance (Desch et al. 1999; Fleischer et al. 1989; Virgo et al. 1995).

Clinical guidelines may be useful in minimizing inappropriate variation in practice (Desch et al. 1999). However, despite recommendations of professional societies, studies have documented wide variations in actual practice with regard to physician reporting (Virgo et al. 1995; Vernava et al. 1994) and receipt (Cooper et al. 1999, 2000; Elston Lafata et al. 2001; Knopf et al. 2001) of surveillance procedures. Consequently, clinical guidelines do not

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always account for individual variation among patients and adherence is often a function of a physician's determination of need based on clinical and nonclinical circumstances, as well as patient preferences.

While many studies document racial disparities in cancer treatment, there are relatively few studies that look at care following initial therapy. The studies that investigated posttreatment bowel surveillance are limited in the data and analytical approaches used. Cooper et al. (1999, 2000) found geographic, but not racial differences among Medicare beneficiaries diagnosed during a single year. This study did not account for censoring in the analysis. In a health maintenance organization (HMO) population diagnosed over a six-year period, racial and socioeconomic differences in posttreatment surveillance were observed, but these findings were from a single HMO with a small sample size and the results did not reach statistical significance with regard to racial differences (Elston Lafata et al. 2001). In addition, the previous studies had insufficient data to monitor changes in racial disparities over time. As in the case of breast cancer screening, it might be thought that disparities in posttreatment surveillance are decreasing over time. This study is unique in being able to investigate that question in a particularly reliable manner because it uses a large longitudinal database.

The objective of the current analysis is to investigate racial differences among Medicare beneficiaries in the receipt of bowel surveillance procedures following colorectal cancer surgery with curative intent, while accounting for racial differences in sociodemographic, hospital, and clinical characteristics. This analysis takes advantage of the SEER-Medicare linked database that is large, national in scope, and population-based.

METHODS

Data Sources

We used data from the National Cancer Institute's (NCI) Surveillance, Epidemiology, and End Results (SEER) program for colorectal cancer cases diagnosed from 1986 through 1996 linked to Medicare claims data through 1998) (<http://healthservices.cancer.gov/seermedicare/>) (Warren et al. 2002). The SEER is a population-based system of cancer registries that collects incident and survival data on all cancers in six metropolitan areas (San Francisco/Oakland, Detroit, Atlanta, Seattle, Los Angeles, San Jose) and five states (Connecticut, Utah, New Mexico, Iowa, Hawaii), and covers approximately 14 percent of the U.S. population. Data from SEER include

site of the tumor, stage, and histology, as well as the initial course of treatment. Information on posttreatment procedures is not maintained in SEER.

The Medicare program, administered by the Center for Medicare and Medicaid Services (CMS), formerly known as the Health Care Financing Administration, provides health insurance coverage to approximately 97 percent of individuals aged 65 and older in the United States. Medicare claims are contained in the Medicare Provider Analysis and Review (MedPAR) files and contain up to 10 diagnoses and 10 procedures for all billed claims coded using both ICD-9-CM diagnoses and CPT-4 procedure codes. These codes facilitate identification of patients who receive surgery for colorectal cancer and posttreatment surveillance activities following potentially curative surgery.

Patients

Details regarding the assembly of the cohort used in this analysis have been described elsewhere (Knopf et al. 2001). Briefly, the cohort consisted of patients who had a diagnosis of adenocarcinoma of the colon or rectum, diagnosed at the local (tumor-node-metastasis [TNM] Stages I or II) or regional (TNM Stage III) stages between January 1, 1986, and October 31, 1996, and who underwent surgery with curative intent. We excluded patients diagnosed with colorectal cancer before age 65, diagnosed by death certificate or autopsy, or who did not have a month or year of diagnosis. Patients with a prior or concurrent diagnosis of any noncutaneous malignancy were also excluded, as well as were patients diagnosed with colorectal cancer in situ, Crohn's disease, and ulcerative colitis. Finally, Medicare beneficiaries enrolled in an HMO before their cancer diagnosis were excluded because Medicare does not cover HMO claims. The analytic cohort consisted of 52,105 patients diagnosed with local or regional adenocarcinoma of the colon or rectum.

Once the cohort was defined, we searched Medicare claims records for patients who had colorectal cancer surgery within two months of the SEER month and year of diagnosis to determine an index date of initial surgery. We sequentially searched the hospital, outpatient, and physician claims files for the presence of a cancer-directed surgery or procedure and assigned a date of initial surgery.

Each patient was followed from the date of initial colorectal surgery, until censored, or until December 31, 1998, the last date for which Medicare claims data were available. Patients were censored if they lost Medicare A/B

entitlement after their index date or enrolled in an HMO after their colorectal cancer diagnosis. In addition, patients were censored if they were enrolled in a hospice after the index date. Patients who died during the follow-up period were censored six months prior to their date of death. Also censored were patients who developed a noncutaneous malignancy other than their index diagnosis of colorectal cancer, a second colorectal cancer primary, as reported by SEER, and patients who developed recurrent colorectal cancer.

Bowel Surveillance

We searched the Medicare claims for all bowel surveillance procedures from the index date until the date of censoring or December 31, 1998. We excluded any surveillance procedures occurring during the first two months after treatment to ensure that perioperative procedures were not counted. Bowel surveillance procedures studied were colonoscopy, sigmoidoscopy, endoscopy, and barium enema. ICD-9-CM and CPT-4 codes for these procedures are detailed elsewhere (Knopf et al. 2001).

Covariates

Sociodemographic, hospital, and clinical characteristics were collected at baseline for all members of the cohort. Sociodemographic variables included SEER race, gender, age at diagnosis, SEER registry, as a measure of geographic region, and education measured at the level of the census tract. Clinical variables included the Charlson comorbidity index, which is a weighted index that takes into account the number and seriousness of comorbid conditions (Charlson et al. 1987; Deyo, Cherkin, and Ciol 1992). We examined inpatient, outpatient, and hospital claims for the presence of comorbid conditions 12 months before diagnosis. We also included stage at diagnosis obtained from SEER as a covariate. We used the American Hospital Association data to determine characteristics about the hospital treating the patients. These variables include hospital ownership (government, nonprofit, and for-profit), hospital bed size, and affiliations with the American College of Surgeons and Council of Teaching Hospitals, which were used to characterize the type of hospital patients received services.

Statistical Analysis

The racial distributions of patient characteristics were compared using chi-square tests. Time to first posttreatment surveillance for each racial category was assessed using Kaplan-Meier (K-M) curves, and the log-rank test was used

to investigate statistical differences in posttreatment surveillance between racial groups. Graphs were plotted as the cumulative proportion of individuals having a posttreatment surveillance event with time since surgery with curative intent. Unconditional logistic regression was used to estimate odds ratios for the effect of race on type of posttreatment bowel surveillance received and to adjust for multiple covariates. We used Cox proportional hazards models to estimate hazard ratios for race and time to first posttreatment surveillance while adjusting for sociodemographic, hospital, and clinical covariates. Standard errors of the Cox regression coefficients were used to calculate 95 percent confidence intervals. The final model was used to predict the probability of posttreatment surveillance at 18, 36, and 60 months after surgery with curative intent for each racial category based on the mean sociodemographic, hospital, and clinical covariate distribution of non-Hispanic whites (Allison 1995). We repeated the analysis for race and time from first to second posttreatment bowel surveillance, as well as for subsequent bowel surveillance during follow-up. All analyses were performed using the SAS version 8.2 statistical software package (SAS Institute 2001).

RESULTS

We analyzed data from non-Hispanic white ($n = 44,768$), black ($n = 2,921$), and members of other racial groups ($n = 4,416$) who had a colorectal cancer diagnosis between January 1, 1986, and October 31, 1996. The racial distributions of patient characteristics are shown in Table 1. Statistically significant racial differences existed for most baseline covariates; some of the differences are small, yet statistically significant due to the very large sample size. Non-Hispanic whites and blacks had a larger proportion of females. Non-Hispanic whites tended to be older than other groups at diagnosis. A higher proportion of other racial groups were diagnosed in the later years of the study than were blacks and non-Hispanic whites. Blacks tended to have higher comorbidity scores, although in general, more minorities than non-Hispanic whites were missing these data. Blacks were overrepresented in communities where a significant proportion of residents lacked a high school diploma. Members of other racial groups were more likely than non-Hispanic whites and blacks to attend for-profit institutions, while blacks were more likely to receive treatment at larger hospitals that were affiliated with the American College of Surgeons and Council of Teaching Hospitals.

Table 1: Colorectal Cancer Patient Characteristics, SEER-Medicare, 1986–1998

<i>Characteristics</i>	<i>Non-Hispanic White (N = 44,768) %</i>	<i>Black (N = 2,921) %</i>	<i>Other (N = 4,416) %</i>
<i>Sociodemographic Characteristics</i>			
Gender*			
Male	47.1	43.3	54.4
Female	52.9	56.7	45.6
Age at Diagnosis*			
65–69	22.0	28.2	29.3
70–74	25.0	28.3	28.0
75–79	23.6	22.4	20.5
80–84	17.3	13.0	14.2
85+	12.1	8.1	8.0
Year of Diagnosis*			
1986	8.4	7.0	5.9
1987	8.4	7.1	5.9
1988	8.7	7.9	6.5
1989	8.9	6.7	7.7
1990	8.9	8.3	7.5
1991	8.8	9.1	8.4
1992	10.5	11.9	11.9
1993	10.3	10.9	11.7
1994	10.1	12.6	13.2
1995	9.3	10.6	12.4
1996	7.7	7.8	8.8
Geographic Region of Residence			
Atlanta	4.4	14.9	0.7
Connecticut	17.4	7.8	3.1
Detroit	14.8	40.0	1.3
Hawaii	1.1	0.2	32.0
Iowa	18.9	1.9	0.5
Los Angeles	7.5	13.7	19.1
New Mexico	3.3	0.9	10.0
San Francisco/Oakland/San Jose	15.7	17.5	27.6
Seattle/Puget Sound	12.9	2.9	4.1
Utah	4.1	0.2	1.5
Percent of Census-tract without High School Diploma*†			
Lowest quartile	26.5	5.6	17.2
2nd quartile	20.8	6.8	15.4
3rd quartile	22.7	17.2	18.2
Highest quartile	17.3	55.4	22.2
Missing	12.7	15.0	27.0

continued

Table 1: *Continued*

<i>Characteristics</i>	<i>Non-Hispanic White (N = 44,768) %</i>	<i>Black (N = 2,921) %</i>	<i>Other (N = 4,416) %</i>
<i>Hospital Characteristics</i>			
Controlling Authority			
Government	11.8	7.9	12.9
Nonprofit	79.5	82.7	70.1
For Profit	5.6	4.6	9.8
Missing	3.2	4.7	7.2
Bed Size			
6–199	32.4	12.6	44.2
200–399	38.0	32.6	38.3
400+	26.4	50.1	10.4
Missing	3.2	4.7	7.2
American College of Surgeons			
Yes	57.4	59.9	60.7
No	39.4	35.4	32.1
Missing	3.2	4.7	7.2
Council of Teaching Hospitals			
Yes	20.3	45.1	9.6
No	76.6	50.2	83.2
Missing	3.2	4.7	7.2
<i>Clinical Characteristics</i>			
Charlson Comorbidity Score			
0	58.4	53.7	55.9
1	21.3	20.3	18.1
≥ 2	7.7	9.5	6.1
No Record [‡]	12.7	16.5	19.9
Stage [¶]			
Localized	53.7	51.7	53.1
Regional	46.3	48.3	46.9

* $p < .0001$

[†]Percent of census-tract without high school diploma categories: Lowest quartile, ≤ 15.75 ; 2nd quartile, 15.76–24.76; 3rd quartile, 24.77–35.4; highest quartile, ≥ 35.5 .

[‡]Unable to calculate Charlson Comorbidity Score for missing records.

[¶]Not statistically significant.

A graphical display of posttreatment bowel surveillance after colorectal cancer surgery with curative intent is shown in Figure 1. There were statistically significant racial differences in time to first posttreatment bowel surveillance (log-rank test, $p < 0.001$). Fifty-seven percent of whites, 48 percent of blacks, and 45 percent of others received posttreatment surveillance within

Figure 1: Time to Receipt of a First Bowel Surveillance Procedure Following Potentially Curative Surgery, SEER-Medicare: 1986–1998

18 months of potentially curative surgery. These racial differences remained at the end of three years (67, 61, and 56 percent) and at the end of five years (74, 70, and 63 percent) after surgery for whites, blacks, and others, respectively.

The Cox proportional hazards models, adjusted for sociodemographic, hospital, and clinical characteristics, for time to first bowel surveillance are shown in Table 2. The rate of posttreatment bowel surveillance was greater for individuals in all racial groups diagnosed between 1991 and 1996 than if diagnosed between 1986 and 1990, and racial differences in posttreatment bowel surveillance existed within those years of diagnosis. Accordingly, the relationship between race and time to first posttreatment bowel surveillance was modified by year of diagnosis ($p = 0.008$). If diagnosed between 1986 and 1990, blacks were 13 percent and patients in other racial groups were 8 percent less likely than non-Hispanic whites to receive posttreatment bowel surveillance, independent of sociodemographic, hospital, and clinical characteristics (RR = 0.87, 95 percent CI = 0.80–0.94; RR = 0.91, 95 percent CI = 0.84–1.00 for blacks and others, respectively). If diagnosed between 1991 and 1996, blacks compared with non-Hispanic whites were 25 percent less likely to have received posttreatment surveillance (RR = 0.75, 95 percent CI = 0.70–0.81). No statistically significant differences in posttreatment bowel

Table 2: Adjusted Cox Proportional Hazards Models for Time to First Bowel Surveillance Following Potentially Curative Surgery, SEER-Medicare: 1986–1998

	Bivariate		Model 1		Model 2		Model 3	
	RR	95% CI	RR	95% CI	RR	95% CI	RR	95% CI
Race*								
Diagnosed 01/01/86–12/31/90								
Non-Hispanic White	1.0	Reference	1.0	Reference	1.0	Reference	1.00	Reference
Black	0.89	0.83–0.96	0.83	0.77–0.90	0.83	0.77–0.90	0.87	0.80–0.95
Other	0.64	0.60–0.69	0.89	0.82–0.96	0.90	0.83–0.98	0.91	0.84–1.00
Diagnosed 01/01/91–10/31/96								
Non-Hispanic White	1.0	Reference	1.0	Reference	1.0	Reference	1.0	Reference
Black	0.78	0.74–0.83	0.75	0.70–0.80	0.75	0.70–0.80	0.75	0.70–0.81
Other	0.75	0.71–0.79	1.00	0.93–1.07	1.02	0.95–1.10	0.99	0.92–1.07

Model 1 adjusts for sociodemographic characteristics; Model 2 adjusts for sociodemographic and hospital characteristics; Model 3 adjusts for sociodemographic, hospital, and clinical characteristics.

* $\chi^2_4 = 68.06, p < .0001$

Table 3: Adjusted* Probability of Bowel Surveillance within 18, 36, and 60 Months, SEER-Medicare, 1986–1998

Race	Diagnosed 01/01/86 to 12/31/90						Diagnosed 01/01/91 to 10/31/96					
	Within 18 Months		Within 36 Months		Within 60 Months		Within 18 Months		Within 36 Months		Within 60 Months	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Non-Hispanic White	51.7		66.4		75.8		64.8		75.1		79.9	
	50.9–52.4		65.6–67.2		75.0–76.6		63.4–66.2		73.7–76.4		78.6–81.2	
Black	47.8		62.3		71.9		54.4		64.8		70.2	
	44.9–50.6		59.1–65.3		68.7–74.8		51.6–57.1		61.9–67.6		67.2–72.9	
Other	49.2		63.7		73.3		63.1		73.5		78.5	
	45.7–52.4		59.9–67.2		69.6–76.5		59.9–66.0		70.4–76.3		75.5–81.1	

*Adjusted for mean sociodemographic, hospital, and clinical characteristics of non-Hispanic whites at diagnosis.

surveillance between non-Hispanic whites and patients of other racial groups were observed when we adjusted for sociodemographic, hospital, and clinical covariates. Differences in posttreatment bowel surveillance between blacks and non-Hispanic whites remained regardless of sociodemographic, hospital, and clinical characteristics.

More than 70 percent of the bowel surveillance procedures received were colonoscopy; however, this proportion also differed by race. Blacks were almost 40 percent more likely than non-Hispanic whites to receive posttreatment bowel surveillance with barium enema when adjusted for sociodemographic, hospital, and clinical covariates (OR = 1.39, 95 percent CI = 1.18–1.63). We did not observe a statistically significant difference in the type of posttreatment bowel surveillance received between non-Hispanic whites and others.

We used the Cox proportional hazards model, adjusted for the mean baseline sociodemographic, hospital, and clinical covariate distribution of non-Hispanic whites, to predict the probability of receiving posttreatment bowel surveillance by 18, 36, and 60 months following the index date. The probability of receiving posttreatment bowel surveillance by month 18, if diagnosed between 1986 and 1990, was 51, 48, and 49 percent for non-Hispanic whites, blacks, and others, respectively. By the end of the fifth year after diagnosis, the probability of receiving posttreatment bowel surveillance increased to more than 70 percent for all racial groups. If diagnosed between 1991 and 1996, the probability of receiving posttreatment surveillance by 18 months after diagnosis was 64, 54, and 62 percent for non-Hispanic whites, blacks, and others, respectively. The difference in the probability of receiving posttreatment bowel surveillance between non-Hispanic whites and blacks increased substantially over the two periods of diagnosis (Table 3).

We observed statistically significant racial differences in the rate of posttreatment bowel surveillance (log-rank, $p = 0.02$) after having received a first procedure (data not shown). Although statistically significant, most likely due to the large sample size, this result may not be clinically meaningful. When adjusted for sociodemographic, hospital, and clinical characteristics, blacks were 9 percent less likely than non-Hispanic whites to receive a second posttreatment bowel surveillance procedure (RR = 0.91; 95 percent CI = 0.85–0.98). No differences in subsequent posttreatment bowel surveillance were observed between non-Hispanic whites and others. This result did not vary by the time of diagnosis. We did not observe racial differences in receipt of the third posttreatment bowel surveillance procedure (log-rank, $p = 0.44$).

DISCUSSION

In a large cohort of more than 52,000 Medicare beneficiaries, we found statistically significant racial differences in posttreatment bowel surveillance after potentially curative colorectal cancer surgery, with blacks being less likely than non-Hispanic whites to receive follow-up surveillance. The observed racial variation in posttreatment bowel surveillance increased slightly after we adjusted for differences in measured sociodemographic, hospital, and clinical characteristics. We also observed that the probability of receiving bowel surveillance increased over time for all racial groups, and the difference in actual receipt between black and white patients also increased. Because the initial dissemination of clinical guidelines coincides with the most recent period of observation, it may be too soon to expect the guidelines to have a significant impact on practice (Knopf et al. 2001), although they may have some impact on the increasing receipt of the first posttreatment bowel surveillance over time. These data are over three years old, and it is probable that, as clinical guidelines become more widely disseminated, this increasing trend as specified by guidelines will continue. However, it is not clear why, in light of the increasing trend of posttreatment bowel surveillance receipt, the racial disparity in use also increased over time.

Other studies have identified racial differences in the receipt and quality of care for a variety of conditions (Cooper et al. 1996; Lee et al. 1997; McMahon et al. 1999; Jencks et al. 2000; Gornick 2000; Mayberry, Mili, and Ofili 2000; Institute of Medicine 2002; Shavers and Brown 2002). Racial disparities in the use of postdiagnostic surveillance among Medicare beneficiaries with cancer have been observed in other types of cancers (Schrage et al. 2003; Schapira, McAuliffe, and Nattinger 2000). However, while these differences have been noted, the reasons for these differences are not well understood. These differences may be the result of problems with access to care or reflect differences in perception between white and black patients or providers regarding posttreatment bowel surveillance.

This study was limited to the Medicare fee-for-service population, therefore, everyone in the cohort had health insurance. However, being Medicare-eligible does not totally eliminate financial access barriers because Medicare imposes deductibles and copayments on its beneficiaries. Expensive procedures, such as colonoscopy, would result in significant copayments for those persons who do not carry supplemental insurance to cover charges not reimbursed by Medicare. Whereas 28 percent of whites have Medigap supplemental coverage, only 7.4 percent of blacks have this coverage (Super

2002). We used the educational attainment of the census-tract to adjust for socioeconomic status in the analysis, but socioeconomic status failed to explain racial differences in the receipt of bowel surveillance. We were unable to assess from these data whether individual-level socioeconomic status played a role in gaining access to bowel surveillance. Financial access, measured by individual-level patient variables, should be explored as a possible barrier to the receipt of routine posttreatment bowel surveillance.

In addition to issues related to financial access to care, there might be other issues related to access to care that explain the disparities in surveillance. For example, colonoscopy must be performed by specialists in facilities that are adequately equipped to provide conscious sedation. Blacks may be more likely to reside in places that have fewer physicians or facilities that offer colonoscopy. However, we observed that once a person underwent the first posttreatment bowel surveillance procedure, racial differences were minimal and disappeared altogether by the receipt of subsequent procedures. This finding suggests that once a person accesses surveillance, he or she is more likely to continue to receive follow-up.

Our data source is limited in its ability to discern if differential receipt of posttreatment bowel surveillance reflects differences by race in a patient's perception related to posttreatment surveillance and if the patient's perception is influenced by the provider's recommendations. A patient's experience during the initial cancer treatment, attitude regarding the need for follow-up, and trust of the recommendations from the physician may influence the use of posttreatment surveillance. There is evidence that physician-patient race concordance is associated with greater participation in care processes, higher patient satisfaction, and greater adherence to treatment (Cooper-Patrick et al. 1999; LaVeist and Nuru-Jeter 2002; LaVeist and Carroll 2002), but it is unclear whether it leads to receipt of standard care.

The provider has significant influence on rates of postdiagnostic surveillance. Earlier studies have shown that the specialty of the provider has an impact on recommendations regarding testing (Burns et al. 1997). It is plausible that black patients were more likely than white patients to seek follow-up care from general practitioners who may recommend different practices regarding postdiagnostic surveillance than do specialists. This difference may explain the fact that blacks received the lower-quality barium enema (Winawer et al. 2000) more often than non-Hispanic whites, although we cannot determine the reason for this from these data. Future research should consider how physician type and physician-patient race concordance

influences racial differences in the receipt of posttreatment bowel surveillance procedures.

Our study is consistent with other studies that identified variation in posttreatment bowel surveillance. Using a SEER-Medicare database of 5,716 patients diagnosed with colorectal cancer in 1991, Cooper et al. (1999, 2000) found statistically significant geographic variations in the use of a variety of posttreatment surveillance procedures, including colonoscopy and barium enema. They did not, however, observe racial variations in the receipt of posttreatment procedures. That study used data from Medicare beneficiaries who were diagnosed during a single year and did not account for the censoring of observations in determining rates of procedure use; these differences in sample sizes and analyses methods may have explained the differences observed in posttreatment bowel surveillance by race. In a managed care population of 251 individuals in southeast Michigan, diagnosed with colorectal cancer between 1990 and 1995, aged 40 and older at diagnosis, minorities (98 percent black) were less likely than whites to receive a complete examination of the colon (Elston Lafata et al. 2001). The actual rate of surveillance was 55 percent within 18 months, which compares to the 57 percent of whites receiving posttreatment surveillance within that period of time in our study. Although the association between posttreatment bowel surveillance and race in the managed care population did not achieve statistical significance, the magnitude of the difference was similar to what we observed in a large population of colorectal cancer patients diagnosed over an 11-year period.

Colorectal cancer survival is lower for blacks than for whites and this may be due, in part, to lower rates of posttreatment endoscopic surveillance. Although the survival benefit of routine posttreatment bowel surveillance with colonoscopy and barium enema is unknown, evidence-based clinical guidelines should improve clinical outcomes and medical practice. Thus, it is disturbing that racial variation in the receipt of posttreatment bowel surveillance exists. We know that a statistically significant reduction in the rate of recurrence and improvement in survival exists among individuals receiving standard adjuvant therapy for stage III colon cancer. Standard adjuvant radiation has been shown to reduce recurrences for stages II and III rectal cancers. However, population-based studies have shown that blacks are less likely than whites to receive these standards of care that have proven benefits (Sundararajan et al. 2001; Schrag, Cramer et al. 2001; Potosky et al. 2002; Schrag, Gelfand et al. 2001; Neugut et al. 2002). Our results showing a lower rate of posttreatment bowel surveillance, coupled with studies showing

lower rates of adjuvant therapy receipt among blacks, suggest a consistent pattern of lower-quality care received by blacks following a diagnosis of colorectal cancer. The combination of routine posttreatment bowel surveillance and adjuvant therapy need to be evaluated for their potential contribution to the racial disparity in survival.

Results of this study must be interpreted considering data limitations. First, claims data are generally constructed for administrative rather than for research purposes. Because there are a limited number of data fields in claims data, codes related to complications may have taken precedence over codes related to comorbidity, leaving some comorbidity unmeasured. This potential incomplete measurement of comorbidity is not likely to adequately explain the observed racial differences in posttreatment bowel surveillance. Second, the indication for follow-up surveillance was not readily apparent from these data. The potential exists that bowel examination in response to symptoms was included with routine posttreatment bowel surveillance procedures in these data, in which case the rate of routine posttreatment surveillance would have been overestimated; however, it is unlikely to explain the differentials in the receipt of procedures that we observed by racial group.

In this large population-based study of Medicare beneficiaries aged 65 and older, we found statistically significant racial variations in posttreatment bowel surveillance receipt that were not explained by measured socio-demographic, hospital, and clinical characteristics. Future studies are needed to determine if patient preferences or physician characteristics are related to racial differences in the receipt of posttreatment procedures. In addition, the impact of racial disparities in the receipt of standard treatment following colorectal cancer surgery on the racial disparity in outcomes, including survival and mortality, requires further study.

ACKNOWLEDGMENTS

The authors would like to thank Drs. Rachel Ballard-Barbash and Robert A. Hiatt for their thoughtful reviews of earlier versions of the manuscript. We would also like to thank Ms. Nicola Schussler, Information Management Services, for compiling the dataset used for analysis. Dr. Ellison was a Cancer Prevention Fellow in the Division of Cancer Prevention, Office of Preventive Oncology, at the National Cancer Institute when he began this work.

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