An Examination of Racial Differences in Process and Outcome of Colorectal Cancer Care Quality Among Users of the Veterans Affairs Health Care System

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Abstract

Our objective was to examine potential racial differences in CRC care timeliness in the Veterans Affairs (VA) health care system. Using a national sample of white and African American men, we examined time from surgery to (1) adjuvant chemotherapy initiation (stages II-III disease); (2) surveillance colonoscopy (stages I-III disease), and (3) death (stages I-III disease). We identified no clinically meaningful racial differences in CRC care timeliness.

Background—Veterans Affairs (VA) manages the largest US integrated health care system. Although quality of VA colorectal cancer (CRC) care is well chronicled, there is a paucity of research examining racial differences in this care. This study examines racial differences in 2 dimensions of quality of VA CRC care: processes (time to treatment) and outcomes (survival).

Patients and Methods—Retrospective data were from the VA External Peer Review Program (EPRP), a nationwide VA quality-monitoring program. Study patients were white and African American men diagnosed with nonmetastatic CRC between 2003 and 2006 who received definitive CRC surgery. We examined 3 quality indicators: time from (1) surgery to initiation of adjuvant chemotherapy (stages II-III disease), (2) surgery to surveillance colonoscopy (stages I-III disease), and (3) surgery to death (stages I-III disease). Unadjusted analyses used log-rank and Wilcoxon tests. Adjusted analyses used Cox proportional hazard models.

Results—In unadjusted analyses, there was no evidence of racial differences across the 3 quality measures. In adjusted Cox regression, there were no racial differences in time to initiation of chemotherapy (hazard ratio [HR], 0.82; *P* = .61) or surgery to death (HR, 0.94; *P* = .49). In adjusted Cox regression, among those receiving colonoscopy within 7 to 18 months after surgery, white patients experienced slightly shorter median times to surveillance colonoscopy than did African American patients (367 vs. 383 days; HR, 0.63; *P* = .02).

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Conclusion—Other than a small racial difference in timing of surveillance colonoscopy, there was little evidence of racial differences in quality of CRC care among VA health care system users.

Keywords

Colorectal neoplasms; Health care disparities; Health care quality; Minority health; US Veterans Affairs

Introduction

The Department of Veterans Affairs (VA) manages the largest integrated health care system in the United States, treating approximately 3% of patients with cancer.[1] Since its national reorganization and transformation in the mid-1990s,[2] the VA has been a leader in providing high-quality equitable care. The quality of cancer care provided in the VA has been extensively examined, with the VA generally performing equal to or better than the private sector.[3,4] Quality of colorectal cancer (CRC) care in particular has been lauded as an area in which the VA provides excellent care.[3,4] In addition to providing quality care overall, there is evidence that racial disparities in CRC care quality may be less significant in the VA than in nonfederal health care systems.[5-7]

An important process measure reflecting quality care is timeliness in receiving evidence-based treatments. The VA has long-standing processes for quality monitoring and performance improvement, focused on achieving guideline-concordant clinical care, which may support its success as a leader in the provision of quality care.[8-11] There is a system-wide emphasis on adhering to guidelines based on strong scientific and clinical evidence. However, standards for timeliness of care are largely consensus based. Perhaps as a result, timeliness standards have not been widely implemented in the VA or other large integrated health care systems. The VA has evaluated several CRC interventions and collaborative efforts to address delays in diagnosis and follow-up on positive screening test results.[12-14] Less attention has been focused on timeliness of care during CRC treatment and early surveillance phases.

Survival can be considered an outcome measure of quality. Although several studies examining survival have produced mixed results about the presence of racial differences,[6,15,16] there is a paucity of literature describing racial differences in timeliness of VA CRC care. Landrum et al. compared cancer-specific and all-cause mortality rates for men older than 65 years receiving care in the VA vs. fee-for-service Medicare. Compared with similar fee-for-service Medicare patients, survival rates for VA users with CRC were equal or better.[3] In the 1990s, Dominitz et al. examined potential racial differences in CRC survival rates, finding similar relative 5-year survival rates for African American and white patients with CRC seeking care in the VA health care system.[6] Jackson et al. examined the timeliness of treatment for patients with nonmetastatic CRC in the VA health care system. For patients with stage II and stage III disease, they found a median of 20 days between diagnosis and initiation of CRC treatment. There was a median of 50 days between definitive surgical resection and start of adjuvant chemotherapy.[17] The authors did not examine patient or disease characteristics associated with timeliness of care.

We expand previous work by examining racial differences in 2 dimensions of quality of VA CRC care: processes (time to treatment) and outcomes (survival).

Patients and Methods

Data Source and Patient Sample

The VA External Peer Review Program (EPRP), the national program for assessing quality of VA health care, was the primary data source.[18] In 2007, the Veterans Health Administration Office of Analytics and Business Intelligence (formerly known as the Office of Quality and Performance) oversaw a national medical record abstraction effort to assess the quality of CRC care. Abstractors accessed the electronic health record remotely, collecting data on disease characteristics and health care delivery provided to patients throughout the VA health care system. We augmented EPRP data with clinical comorbidity and demographic information contained in the Veterans Affairs Central Cancer Registry and administrative data (specifically inpatient and outpatient Medical SAS files).

The sample has previously been described in detail.[17] Succinctly, patients were identified for inclusion in EPRP based on a search algorithm that defined a representative sample of VA patients diagnosed with CRC between October 1, 2003 and March 31, 2006. The algorithm made use of administrative diagnosis, procedure, and encounter data stored in the centralized VA Decision Support System.[17,19] Eligible patients had an ICD-9 code for colon and/or rectal cancer within 3 months (before or after) of the study diagnosis period.[20] Eligible patients must also have had a clinic visit, surgical procedure, or pathology report in the VA that corresponded to receipt of medical services within the aforementioned time frame. The final analytic data set included patients with nonmetastatic CRC (stages I-III), an incident occurrence (first diagnosis of CRC occurred during the study period), receipt of definitive surgical resection for CRC, and a successful link with information from VA administrative data sources. We obtained vital status information in May 2012, resulting in a median follow-up period of approximately 6 years (2160.5 days) after surgery. Because of the small number of non–African American minorities and women, analysis was restricted to white and African American male patients (Fig. 1). We did not have information regarding Hispanic ethnicity.

Measures

We examined 3 stage-specific quality metrics for CRC care: (1) time from definitive CRC surgical resection to initiation of 5-fluorouracil (5-FU)–based adjuvant (eg, postoperative) chemotherapy (stage II or III),[21] (2) time from definitive surgical resection to receipt of surveillance colonoscopy (stage I, II, or III),[22-27] and (3) time from definitive CRC surgical resection to death (stage I, II, or III). The first 2 measures reflect process indicators of quality, whereas the third indicator measures survival as a critical outcome. We also examined whether comorbidities and demographic factors were mediators of differences in survival and other timeliness of care events.

The date of surgical resection was used as the anchor date for all 3 measures for several reasons. First, the date of surgery is a decisive date, unlike the date of diagnosis, which is often difficult to define (eg, date of positive screening test result, date of pathology report, date of physician's suspicion of CRC). Exploratory analysis of these data confirmed that for many patients, the date of surgery preceded the date of diagnosis, likely because of ambiguity about the date of diagnosis. Second, all patients in the sample underwent surgical resection, making it a feasible anchor date. Finally, some patients may have been diagnosed outside of the VA health care system but then entered the VA health care system for their cancer care. Using the surgery date as the index enables a better examination of processes of care within the VA.

Additional inclusion and exclusion criteria were applied for each of the 3 quality measures. For surveillance colonoscopy, patients must have survived at least 1 year after surgery to be

included in analysis. Most clinical guidelines during this period, including the National Comprehensive Cancer Network[26,27] and the American Cancer Society,[28] recommended a surveillance colonoscopy 1 year after surgery. For descriptive and univariate analyses, we included all surveillance colonoscopy results in the analysis. For multivariable regression analysis, we limited surveillance colonoscopies to those occurring within 7 to 18 months after surgery, because colonoscopies occurring before 7 months after surgery might be diagnostic; the maximum of 18 months reflects pragmatic challenges to receiving this test within the recommended 12 months (eg, scheduling challenges, patient preference). For each of the 3 quality indicators, we calculated the number of days between the surgery date and the date of the event.

Covariates, identified a priori, included patient characteristics associated with timeliness of cancer care.[29-31] We considered both demographic (age at diagnosis, marital status, geographic region) and disease (stage at diagnosis, comorbidity) characteristics. The comorbidity measure was the National Cancer Institute (NCI) Combined Comorbidity score, created from inpatient and outpatient medical record data from 1 year before CRC diagnosis until 1 month before diagnosis. This weighted comorbidity score has previously been validated in a CRC cohort.[32]

Statistical Analysis

We used the Kaplan-Meier method to estimate time-to-event curves. To compare differences in unadjusted survival curves, we used the log-rank and Wilcoxon tests. Multivariate Cox proportional hazards models were used to assess the prognostic power of race for time to event in the presence of the aforementioned covariates. The Efron method was used to handle ties.[33,34] Data management and analyses were conducted in STATA, version 11 (StataCorp LP, College Station, TX) and SAS, version 9.2 (SAS Institute, Cary, NC). The institutional review boards at the Durham VA Medical Center and at the University of North Carolina at Chapel Hill approved this project.

Results

The final sample consisted of 2022 men who met eligibility criteria (Fig 1). Reflecting the overall VA patient population, the sample had a mean age at diagnosis of 68 years. The majority of patients were white (85%), married (52%), and lived in the southern United States (38%). Disease stage was approximately evenly distributed. The mean National Cancer Institute (NCI) Combined Comorbidity Index score was 0.27 (Table 1). The most commonly diagnosed individual comorbid conditions were diabetes (27%) and cardiovascular-related diseases (24%).

Across the sample, the median time from surgery to initiation of adjuvant 5-FU–based chemotherapy was 49 days; medians were not statistically different for African American and white patients (55 vs. 49 days, respectively; $P = .71$). In unadjusted analyses, there were no statistically significant racial differences in time-to-event curves for surgery to initiation of adjuvant 5-FU–based chemotherapy (Wilcoxon $P = .78$; log-rank $P = .10$). Similarly, in adjusted multivariable Cox regression, race was not associated with time from surgery to start of adjuvant 5-FU–based chemotherapy (HR, 0.82; $P = .61$). The region in which patients received care was significant. Compared with those living in the southern United States, patients living in the northern (HR, 0.06; $P = .01$) and central (HR, 0.33; $P = 0.04$) regions had shorter times from surgery to chemotherapy. Small sample sizes did not permit us to explore race by region interactions.

When examining all surveillance colonoscopies after surgical resection, the mean time from surgery to first surveillance colonoscopy was 396 days; the median time was 368 days.

Unadjusted analyses found no statically significant differences in medians between African American and white patients (383 vs. 367 days; $P = .10$) or in time-to-event curves for time from surgery to first surveillance colonoscopy (Wilcoxon $P = .23$; log-rank $P = .05$). In adjusted multivariable regression analyses, considering only surveillance colonoscopies within a guideline-concordant 7 to 18 months after surgery, a racial difference in time to receipt of first surveillance colonoscopy was suggested. White race was protective for a shorter time to surveillance colonoscopy (HR, 0.63; $P = .02$) (Table 2). Although the association was statistically significant, the magnitude of the difference is small (16 days) and not likely to be clinically meaningful. Compared with patients living in the southern United States, those living in the central region (HR, 1.84; $P = 0.00$) had longer times from surgery to colonoscopy. Compared with patients aged 75 years or older, patients (HR, 1.60; $P = .04$) aged 65 to 74 years were more likely to receive surveillance colonoscopy.

Across the sample, the median time from surgery to death was 1053 days, and the unadjusted difference was similar for African American and white patients (1050 vs. 1062 days, respectively; $P = .04$). In unadjusted analyses, there were no statistically significant racial differences in time-to-event curves in time from surgery to death (Wilcoxon $P = .32$; log-rank $P = .33$).

Similarly, in adjusted multivariable Cox regression, race was not associated with time from surgery to death (HR, 0.94; $P = .49$). Notably, several covariates were significant. Patients aged 55 years or younger had a lower hazard of death compared with patients 75 years or older (HR, 0.76; $P = .04$). Compared with patients with stage II disease, those with stage I disease had reduced hazards of death (HR, 0.84; $P = .04$) and those with stage III disease had increased hazards of death (HR, 1.32; $P = .00$), which would be expected based on known clinical outcomes for cancer stage (Table 2).

Discussion

We examined whether racial differences existed in the quality of CRC care delivered by the VA, the largest integrated health care system in the United States. Using 2 stage-specific, evidence-based process measures (time to adjuvant chemotherapy and time to colonoscopy) and patient outcome (survival after surgery), we found no meaningful racial disparities with respect to these 3 quality measures. These findings support the perception of the VA as an "equal access system" committed to the provision of quality timely CRC care.[2,16,35]

The first process quality measure examined was time from surgery to initiation of 5-FU–based adjuvant chemotherapy. Consistent with previous literature, we found that the VA provides racially equal care on this metric.[6] We identified possible geographic variations in care. Because of the sample size, this analysis aggregated regional data at a relatively high level (eg, 4 geographic regions nationwide). Based on these data, we do not know whether patients of different races who are receiving health care in the VA system disproportionately live in specific geographic regions. It is possible that these regional differences confound the ability to accurately assess racial differences. Future analyses could further investigate this phenomenon using more granular regional data.

In our analyses, potential racial differences were identified for only 1 process measure— receipt of surveillance colonoscopy. The difference in elapsed time to colonoscopy between the 2 groups (approximately 16 days on average) is small and the clinical significance of this difference is likely minimal. To ensure that this gap does not widen, additional research is needed to understand underlying mechanisms creating this time difference. Although not the focus of our analyses, there is nearly universal evidence that CRC survivors receive inadequate colonoscopic surveillance. The under-provision of surveillance colonoscopy has

been documented among Medicare users, population-based patient samples, and users of the VA health care system.[17,22,29,31] Although surveillance colonoscopy is generally underreceived, previous studies have suggested that patients of white and African American races receive colonoscopy equitably within the VA health care system.[6] This is important contextual information for interpreting our study findings. This finding is consistent with previous studies on the subject. A recent systematic literature review by Salz et al. examined differences in timeliness of colonoscopy use among CRC survivors receiving care at multiple types of health care institutions.[22] The authors identified 8 studies addressing racial differences in time to colonoscopy. Half of the articles described a small but significant racial difference in receipt of timely colonoscopy; the remaining half showed a nonsignificant trend in the same direction.[22] There is no scientific evidence suggesting that a narrow difference in time (eg, 16 days on average) would impact care quality or patient outcome. There were also differences in age at diagnosis and receipt of surveillance colonoscopy; older people were less likely to receive a timely colonoscopy than their younger counterparts. This is as anticipated. Increasing age is often associated with decreased performance status and increased comorbidity burden. Therefore, it is possible that few patients aged 75 years or older would be expected to receive surveillance colonoscopy, and for those who do receive surveillance colonoscopy, the timeline may be extended.

As an outcome of care quality, we examined postsurgical survival times. Among the 49% who died (n = 992), patients survived a median of approximately 3 years after surgery. Although we controlled for comorbidity status, this survival time for patients with nonmetastatic disease may be evidence of patient frailty. This survival finding may impact receipt of surveillance care (eg, a high degree of patient frailty could explain the appropriate withholding of surveillance colonoscopy). We identified similar survival times among different racial groups. In nonfederal health care settings, including integrated systems serving Medicare patients, there have been mixed findings regarding racial differences in CRC survival.[6,36-38] Our finding of similar postsurgical survival rates between white and African American patients may suggest that the VA provides similar processes of quality care to patients throughout their disease trajectory, translating into comparable survival times. This hypothesis is supported by existing literature.[17,38]

This analysis has several limitations. First, veterans who receive care through the VA health care system have greater comorbidity than the general population.[39] We adjusted for comorbidity, but some patients may have appropriately not received care (eg, too frail to undergo colonoscopy). Our analysis was limited to men and those receiving care in the VA. Because of the small number of women in these data (43 overall; 88.4% white and 11.6% African American), we were unable to make statistical inferences about this group. The number of women seeking care in the VA health care system is growing, and future studies should endeavor to assess cancer care timeliness in this group. Some patients receiving care in the VA health care system may also receive a portion of their cancer care elsewhere. Future research should endeavor to include information from multiple data sources. Despite these limitations, our analysis provides important insight into the quality and timeliness of VA CRC care.

Conclusion

We assessed key process and outcome measures of care quality and observed no evidence of clinically meaningful racial differences in timeliness of CRC care provided by the VA health care system. This may be a testament to the VA's history as an "equal access system"[2,16,35] and its established commitment to ongoing quality monitoring and improvement.

Acknowledgments

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Clinical Practice Points

- VA cancer care has been previously examined and it performance is largely considered to be equal to or better than that of the private sector.[3,4] Historical studies have provided evidence that relative to nonfederal health care systems, racial disparities in CRC care quality may be mitigated in the VA health care system.[5-7]

- We expanded previous work by examining racial differences in 2 dimensions of quality of VA CRC care: processes (time to treatment) and outcomes (survival). We identified no evidence of clinically meaningful racial differences in time from surgery to initiation of chemotherapy, surveillance colonoscopy, or death. Moreover, care was administered within acceptable time frames. Median time from surgery to adjuvant chemotherapy was approximately 7 weeks.

- During the time that these patients were treated (2003-2006), the generally accepted goal was to administer chemotherapy within 6 to 12 weeks postoperatively. Similarly, the median time to colonoscopy was approximately 368 days. This is very close to the 1-year goal (ie, 365 days).

- Although access to care and causality were not examined as part of our study, these data seem to suggest that when patients are given equal access to care, their outcomes can be comparable. Moreover, these findings highlight the importance of clinicians' adherence to clinical practice guidelines and timeliness recommendations.

- Clinicians play a critical role in guaranteeing that patients receive proper care at appropriate time intervals.

2896 patients included in EPRP

874 patients excluded:
n = 119 noninvasive/stage 0
n = 285 metastatic/stage IV
n = 8 missing comorbidity information
n = 11 missing age at diagnosis
n = 35 missing marital status
n = 314 missing race
n = 59 other minority race
n = 43 women
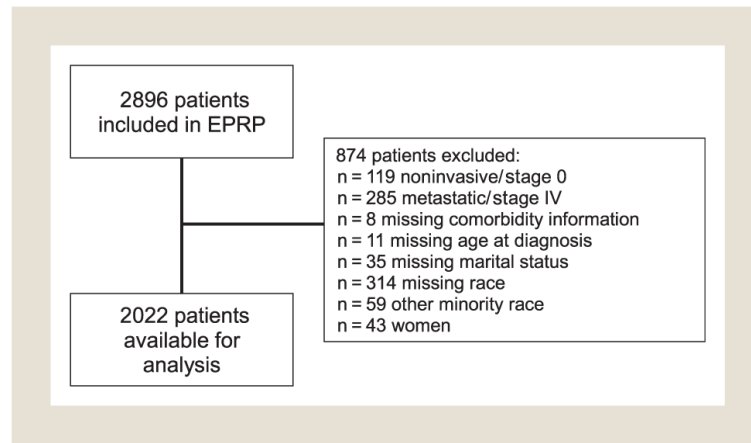
2022 patients available for analysis

Figure 1.
Colorectal Cancer Cohort Assembly

Table 1

Description of CRC Patient Cohort and Key Variables

Variable	White Patients (n = 1712) % (n) or Mean (SD)	African American Patients (n = 310) % (n) or Mean (SD)	Full Sample (n = 2022) % (n) or Mean (SD)
Dependent Variables			
Surgery to adjuvant 5-FU chemotherapy (d)	63.5 (55.1)	65.6 (45.6)	63.8 (53.6)
Surgery to surveillance colonoscopy (d)[a]	391.9 (195.4)	420.4 (221.8)	396.0 (199.6)
Surgery to death (d)	1136.6 (730.4)	988.0 (1258.6)	1112.9 (838.1)
Independent Variable			
White race	100% (1712)	0% (0)	84.7% (1712)
Other Control Variables			
Age at diagnosis			
< 55 years	8.1% (138)	13.6% (42)	8.9% (180)
55-64 years	30.5% (522)	30.0% (93)	30.4% (615)
65-74 years	28.7% (492)	27.1% (84)	28.5% (576)
75 + years	32.7% (560)	29.4% (91)	32.2% (651)
Married	53.9% (922)	39.7% (123)	51.7% (1045)
Region of United States			
South	34.2% (586)	56.1% (174)	37.6% (760)
North	19.7% (337)	15.8% (49)	19.1% (386)
Central	22.7% (388)	20.3% (63)	22.3% (451)
West	23.4% (401)	7.8% (24)	21.0% (425)
Stage at diagnosis			
Stage I	30.3% (518)	30.3% (94)	30.3% (612)
Stage II	38.4% (657)	32.3% (100)	37.4% (757)
Stage III	31.4% (537)	37.4% (116)	32.3% (653)
NCI Combined Comorbidity Score	0.28 (0.43)	0.25 (0.40)	0.27 (0.43)

Abbreviations: NCI = National Cancer Institute; SD = standard deviation.

[a] The sample size is larger in the Cox regression models because colonoscopies occurring outside of this time window are included as failures

Table 2

Cox Proportional Hazard Model Regression Results

	Surgery to Chemotherapy[a]			Surgery to Colonoscopy[b]			Surgery to Death[c]		
	HR	95% CI	*P* Value	HR	95% CI	*P* Value	HR	95% CI	*P* Value
Demographic Characteristics									
White	0.82	0.38-1.76	.61	0.63	0.43-0.94	.02[*]	0.94	0.79-1.12	.49
Married	0.70	0.35-1.39	.30	1.28	0.91-1.78	.15	0.97	0.86-1.10	.66
Age at Diagnosis									
< 55 years	2.78	0.71-10.94	.14	1.58	0.89-2.81	.12	0.76	0.56-0.99	.04[*]
55-64 years	2.36	0.66-8.36	.18	1.28	0.82-1.99	.27	0.99	0.84-1.18	.96
65-74 years	1.76	0.46-6.70	.41	1.60	1.03-2.47	.04[*]	0.90	0.77-1.06	.21
75 + years (reference)									
Region of United States									
North	0.06	0.01-0.49	.01[*]	0.90	0.56-1.44	.65	1.10	0.92-1.33	.29
Central	0.33	0.11-0.97	.04[*]	1.84	1.23-2.76	.00[*]	0.99	0.84-1.18	.96
West	0.39	0.15-0.99	.05	1.13	0.68-1.87	.64	1.02	0.86-1.21	.85
South (reference)									
NCI Combined									
Comorbidity Score	1.69	0.68-4.19	.26	1.44	0.92-2.26	.11	1.01	0.89-1.15	.83
Stage at Diagnosis									
Stage I	–	–	–	1.17	0.81-1.69	.41	0.84	0.71-0.99	.04[*]
Stage II (reference)									
Stage III	–	–	–	0.85	0.55-1.32	.48	1.32	1.13-1.53	.00[*]
N	632			1083			991		

–Indicates that stage was not included in the surgery to chemotherapy timeliness measure because analysis was limited to patients with stage II and stage III disease.

Abbreviations: CI = confidence interval; HR = hazard ratio; NCI = National Cancer Institute.

[a] This measure was time from definitive surgical resection to initiation of 5-FU–based chemotherapy (stages II-III).

[b] This measure was time from surgery to receipt of surveillance colonoscopy within 7 to 18 months (stages I-III).

[c] This measure was time from surgery to death (stages I-III).

[*] Indicates statistical significance at the < .05 alpha level.