Racial Disparities in Cancer Therapy

Did the Gap Narrow Between 1992 and 2002?

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Dr. Gross's efforts were supported by a Beeson Career Development Award (1 K08 AG24842) and the Office for Eliminating Cancer Disparities of the Yale Comprehensive Cancer Center. Dr. Smith's efforts were supported by an American Society of Clinical Oncology Young Investigator Award.

None of the authors have any significant conflicts of interest to declare.

This study used the linked SEER-Medicare database. The interpretation and reporting of these data are the sole responsibility of the authors. The authors acknowledge the efforts of the Applied Research Program, NCI; the Office of Research, Development and Information, CMS; Information Management Services (IMS), Inc.; and the Surveillance, Epidemiology, and End Results (SEER) Program tumor registries in the creation of the SEER-Medicare database.

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Received June 25, 2007; revision received September 4, 2007; accepted September 10, 2007.

BACKGROUND. The purpose of this study was to determine whether racial disparities in cancer therapy had diminished since the time they were initially documented in the early 1990s.

METHODS. The authors identified a cohort of patients in the SEER-Medicare linked database who were ages 66 to 85 years and who had a primary diagnosis of colorectal, breast, lung, or prostate cancer during 1992 through 2002. The authors identified 7 stage-specific processes of cancer therapy by using Medicare claims. Candidate covariates in multivariate logistic regression included year, clinical, and sociodemographic characteristics, and physician access before cancer diagnosis.

RESULTS. During the full study period, black patients were significantly less likely than white patients to receive therapy for cancers of the lung (surgical resection of early stage, 64.0% vs 78.5% for blacks and whites, respectively), breast (radiation after lumpectomy, 77.8% vs 85.8%), colon (adjuvant therapy for stage III, 52.1% vs 64.1%), and prostate (definitive therapy for early stage, 72.4% vs 77.2%, respectively). For both black and white patients, there was little or no improvement in the proportion of patients receiving therapy for most cancer therapies studied, and there was no decrease in the magnitude of any of these racial disparities between 1992 and 2002. Racial disparities persisted even after restricting the analysis to patients who had physician access before their diagnosis.

CONCLUSIONS. There has been little improvement in either the overall proportion of Medicare beneficiaries receiving cancer therapies or the magnitude of racial disparity. Efforts in the last decade to mitigate cancer therapy disparities appear to have been unsuccessful. ***Cancer* 2008;112:900–8.** © *2008 American Cancer Society.*

KEYWORDS: disparities, access, race, breast cancer, colon cancer, prostate cancer, lung cancer.

Racial disparities have been demonstrated at each step of the cancer-care continuum, ranging from the unequal distribution of cancer risk factors to inequities in prompt diagnosis and appropriate therapy.[1–3] Even among patients who have Medicare insurance, for whom a substantial proportion of cancer therapy costs are reimbursed, there is abundant evidence of inequity in cancer care among patients diagnosed in the early and mid-1990s.[2,4–11] Increased recognition of the prevalence of healthcare disparities during the 1990s has led not only to increased attention but also to substantive initiatives promoted by foundations and by all levels of government.[1,12–16]

Given the recent attention and investment in ensuring access to appropriate cancer care, it is important to address 2 key knowledge gaps. First, there is a need to assess whether access to cancer therapies

DOI 10.1002/cncr.23228
Published online 7 January 2008 in Wiley InterScience (www.interscience.wiley.com).

has increased in the overall population. Second, it is unclear whether there has been any reduction in cancer disparities. Some analyses have reported that racial therapy disparities persisted from 1992 through 1999 among patients diagnosed with early stage prostate or breast cancer.[11,17–19] Conversely, a separate analysis of colorectal cancer therapy in the National Cancer Data Base suggested that while a racial disparity in receipt of adjuvant therapy existed in 1990–1991, it no longer existed in 2001–2002.[20] However, these findings were not adjusted for patient, tumor, or health system characteristics.[20]

We, therefore, evaluated the cancer care received by Medicare beneficiaries who were diagnosed with common cancer types from 1992 through 2002. We identified cancer therapies for which racial disparities had been previously recognized and determined whether there had been a temporal change in cancer care for the overall Medicare population or in the magnitude of racial disparities.

MATERIALS AND METHODS

We assessed patterns of care from 1992 through 2002 among Medicare beneficiaries diagnosed with malignant breast, colorectal, lung, and prostate cancer, which represent the 4 most common causes of cancer death.[21] We obtained data from the Surveillance, Epidemiology, and End Results (SEER)-Medicare database, which links SEER cancer registry data to a master file of Medicare enrollees at the individual patient level.[32]

For each cancer type, we identified curative or adjuvant therapies that were recommended or widely used from the early 1990s or earlier. These included surgical therapy for early stage (I/II) breast or lung cancer, adjuvant chemotherapy for breast (hormone receptor negative, stage II/III) and colon cancer (stage III), radiation after lumpectomy in breast cancer (stage I/II), and (neo)adjuvant radiation and adjuvant chemotherapy in rectal cancer (stage II/III). We also assessed the use of "definitive therapy" for patients with early stage prostate cancer (defined as prostatectomy, brachytherapy, or external beam radiation therapy), despite the limited evidence of efficacy, because of the substantial burden imposed by prostate cancer on black men.[4,8,9,22–31] Because both mastectomy and lumpectomy with radiation are considered definitive therapy for early stage breast cancer, we focused on the rate of mastectomy among women not receiving a lumpectomy and the rate of radiation usage among women receiving a lumpectomy. However, preliminary analysis demonstrated no clinically significant disparity in mastectomy usage and probabilities of therapy that were near 100% in all race-time combinations; therefore, we excluded mastectomy.

Study Sample

We included only patients with specific cancer types and stages for which the relevant process measures were recommended in our study sample (Table 1). Several of the process measures required specific previous courses of therapy to be eligible for the study. For example, adjuvant chemotherapy for colon cancer presumes that the patient has already undergone surgical resection of the tumor. Furthermore, because we were unable to assess the suitability of therapy for individual study subjects, we required that nonlung cancer subjects survive 6 months after their eligibility for a process measure. For lung cancer, we waived the survival requirement because of the high operative mortality associated with lung resection. Initially, we had 14,071 colon, 8701 rectal, 41,570 lung, 65,126 breast, and 129,415 prostate cancer patients; all were classified as malignant, primary cancers in the relevant stage groups, diagnosed from 1992 through 2002, between the ages of 66 and 85 years, and had a known month of diagnosis. To incorporate into our analysis healthcare claims from the full year before cancer diagnosis, we excluded patients who had not been enrolled in fee-for-service Medicare part B for the 12 months before their cancer diagnosis (17,593 patients were excluded.). We also excluded patients who died before or during the month of cancer diagnosis (6 patients), who were not black or white (17,638 patients) because prior authors have questioned the validity of ethnicity data in SEER-Medicare, who did not receive required therapies in the 6 months after diagnosis (203 patients), who lost Medicare A and B coverage or entered a health maintenance organization (HMO) in the 6-month period after diagnosis (for lung and prostate cancer) or previous therapy (all other) (9311 patients), or who died during that period (except lung cancer; 5369 patients), yielding 7775 colon, 1745 rectal, 11,207 lung, 40,457 breast, and 82,238 prostate cancer cases.[32]

Construction of Variables

Cancer therapies were identified by using Medicare claims codes including International Classification of Diseases (ICD-9-CM),[28] Current Procedure Terminology (CPT),[23] and SEER therapy codes (Table 1).[52–54] Comorbid conditions that comprise the Charlson index were identified based on combined inpatient, outpatient, and physician claims from 12 months before cancer diagnosis until the month preceding

TABLE 1
Cancer Therapies, Therapy Eligibility Criteria, and Administrative Claims Codes

Therapy	Cancer type (characteristics)	Procedure	Claims codes
Radiation after lumpectomy	Breast Stage I, II[29,52] (post-lumpectomy)	Lumpectomy[11,29,52]	ICD-9-CM 85.20–85.23, 85.25 HCPCS 19110, 19120–6, 19160–2 SEER 1* 10, 20 SEER 2† 10–17
		Radiation[11,29]	ICD-9-CM V58.0, V66.1, V67.1, 92.20–92.29 HCPCS 77400–499, 77750–99 Revenue 330, 333, 339, 973
Adjuvant chemotherapy	Breast Stage II, III (post resection, HR-)	Chemotherapy[53]	ICD-9-CM V58.1, V66.2, V67.2, 99.25 HCPCS Q0083–5, J9000–9999, 96400–450 Revenue 331, 332, 335
Adjuvant chemotherapy	Colon Stage III (post-resection)	Resection[9]	ICD-9-CM 45.71, 45.73–45.95, 48.41–48.69 HCPCS 44140–44147 SEER 1* 30, 40, 50, 60, 70, 80, 90 SEER 2† 30–31, 40, 50–51, 60, 70, 80, 90
		Chemotherapy[9]	See above
Adjuvant chemotherapy and (neo)adjuvant radiation	Rectum Stage II, III (post-resection)	Resection[8]	See above
		Radiation[8]	See above
Definitive therapy (prostatectomy. external radiation, or brachytherapy)	Prostate Stage I	Surgery[2,54]	ICD-9-CM 60.50, 60.60 HCPCS 55810–5, 55840–5 SEER 1* 10, 20, 30, 40, 50, 60, 70, 80, 90 SEER 2† 10–17, 30, 40, 50, 70, 80
		Radiation[2,19]	ICD-9-CM V58.0, V66.1, V67.1, 92.20–92.26, 92.29 HCPCS 77400–499 Revenue 330, 333, 339, 973
		Brachytherapy[19]	ICD-9-CM 92.27–92.28 HCPCS 55859, 55862–5, 77750–77799.
Surgical resection	Lung Stage I, II	Surgery[28]	ICD-9-CM 32.09–32.10, 32.29–32.90 HCPCS 32440–32500, 32520–5, 32999 SEER 1* 10, 20, 30, 40, 50, 60, 70, 80, 90 SEER 2† 10–14, 20–22, 30–32, 40, 50–54, 60, 70, 80

* SEER site-specific surgery codes through 1992–1997.
† SEER site-specific surgery codes from 1998–2002.

diagnosis.[33] Median household income, an ecologic measure, was drawn from the smallest geographic unit available (patients' census tract if available, otherwise zip code). State buy-in of Medicare coverage was defined as having 2 or more months of state buy-in coverage (a sensitive, but not specific, indicator of poverty) in the calendar year of cancer diagnosis and the preceding year. We defined subjects as having seen a physician for evaluation and management if there was at least 1 claim for a physician visit for evaluation and management (CPT/HCPCS codes: 99,201–99,205, 99,211–99,215, 99,387, 99,397, 99,401–99,404, and 99,241–99,245) in the window beginning 12 months before diagnosis and ending the month before diagnosis.[34] Among women with breast cancer, we defined hormonal receptor status as negative if both the estrogen and progesterone receptor status variables were recorded as negative. Tumors were staged by using the American Joint Committee on Cancer 3rd edition (for breast, colon, lung, and rectal cancer); for prostate cancer we used historical stages.[2]

Statistical Analysis

Bivariate associations between the process of care measures and candidate covariates were assessed by likelihood ratio chi-square tests for categorical covariates and Student *t* test for continuous covariates. Time was grouped into 3 periods a priori as follows: Period I from 1992 to 1994, Period II from 1995 to 1999, and Period III from 2000 to 2002.

Separate multivariate analyses were conducted for each cancer type and therapy. We estimated a series of logistic regression models to assess the relation between race, time period, and each cancer therapy. The first model assessed the relation between the process measure and basic demographic information (age, sex, and martial status, geographic region, urban or rural residence, and presence of a physician visit in the previous year) in addition to

TABLE 2
Patient Characteristics

	Cancer type													
	Colon			Rectal			Lung			Breast			Prostate		
Patient characteristic	**White**	**Black**	**P**	**White**	**Black**	**P**	**White**	**Black**	**P**	**White**	**Black**	**P**	**White**	**Black**	**P**
Total	7434	707		2825	145		10,397	810		38,118	2336		74,288	8040	
%	64.1	52.1	<0.001	48.9	35.2	0.001	78.5	64.0	<0.001	92.8	88.7	<0.001	77.2	72.4	<0.001
Mean Age (SD)	75.3	74.5	<0.001	74.3	73.5	0.078	73.8	72.6	<0.001	74.3	73.7	<0.001	73.5	72.9	<0.001
Gender %															
Female	55.3	64.6	<0.001	44.7	49.7	0.24	47.5	42.7	0.008	100.0	100.0	NM	0.0	0.0	NM
Socioeconomic status															
Low Income*	1328	420	<0.001	539	93	<0.001	1858	528	<0.001	7120	1483	<0.001	12,928	4857	<0.001
State buy-in†	537	176	<0.001	198	38	<0.001	753	247	<0.001	2679	747	<0.001	2832	1077	<0.001
Physician visits															
None	421	77	<0.001	131	23	<0.001	478	90	<0.001	828	87	<0.001	3103	834	<0.001
1 or more‡	7013	630		2694	122		9919	720		37,290	2249		71,185	7206	
Comorbidity															
Myocardial infarction	2.2%	2.0%	0.76	1.3%	§	0.94	1.9%	2.3%	0.43	0.7%	0.9%	0.21	1.0%	1.1%	0.84
Old MI	3.7%	2.0%	0.018	2.6%	§	0.68	4.7%	4.1%	0.44	1.4%	1.6%	0.26	2.0%	1.9%	0.53
Heart Failure	11.4%	12.0%	0.63	6.2%	6.9%	0.72	9.3%	12.0%	0.013	4.4%	8.0%	<0.001	3.9%	5.9%	<0.001
Peripheral vascular disease	3.7%	4.0%	0.74	2.9%	§	0.27	6.7%	7.3%	0.49	1.8%	3.6%	<0.001	2.1%	3.6%	<0.001
Stroke	5.4%	7.4%	0.03	3.6%	5.5%	0.22	7.1%	8.6%	0.11	3.4%	5.6%	<0.001	3.5%	4.7%	<0.001
COPD	15.0%	12.4%	0.072	12.4%	12.4%	0.99	43.4%	42.8%	0.77	9.3%	9.8%	0.41	8.6%	10.2%	<0.001
Diabetes	15.8%	25.5%	<0.001	12.9%	17.9%	0.082	11.2%	20.4%	<0.001	11.2%	24.2%	<0.001	9.5%	16.7%	<0.001
Diabetes w/sequelae	3.0%	4.1%	0.096	1.8%	5.5%	0.002	2.4%	5.1%	<0.001	1.8%	5.8%	<0.001	1.5%	3.2%	<0.001
Chronic renal failure	1.1%	2.4%	0.002	1.0%	§	0.69	1.4%	4.0%	<0.001	0.6%	2.7%	<0.001	0.9%	2.1%	<0.001
Ulcers	2.5%	3.5%	0.088	1.2%	§	0.58	1.8%	2.8%	0.038	0.9%	1.5%	0.002	0.8%	1.6%	<0.001
Rheum	1.6%	1.4%	0.65	1.4%	§	0.49	2.9%	1.9%	0.082	2.0%	2.2%	0.53	1.0%	0.7%	0.002

* Low income indicates patient resides in an area with the lowest quintile for median income.

† State buy-in indicates patient had 2 or more months of state buy-in Medicare coverage in the year of and the year preceding diagnosis.

‡ Patient had 1 or more evaluations and management visits in the period beginning 12 months before and ending one month before diagnosis

§ In concert with Surveillance, Epidemiology, and End Results – Medicare policy, cell sizes less than 5 have been suppressed.

Comorbid conditions with prevalence (across all cancer types) of less than 2% are suppressed: Surgical Peripheral Vascular disease, Dementia, Paralysis, Various Cirrhodites, Moderate-Severe Liver Disease, Ulcers (2), and AIDS.

race and time period. The second model also included characteristics defining the tumor (cancer stage and grade). The third model included the 18 conditions comprising the Charlson comorbidity index (model 3) and was the primary model for analytic purposes because this model is in keeping with the Institute of Medicine definition of racial disparities.[35] Subsequently, we also incorporated socioeconomic status (SES) (model 4) to see if SES explained part of the disparity. For each cancer care process, we also estimated alternative models that included race-by-time and race-by-SES interactions; the final models did not include these terms because none of them were found to be significant.

To estimate the magnitude of disparities associated with race, we computed predicted probabilities of receipt of care for each process measure. Predicted probabilities were computed by manipulating the relevant variables (black or white race and time—Period I or Period III) while holding all other variables at the marginal distribution for the sample, with the exception of age, which we standardized to 75 years. Standard errors for predicted probabilities and absolute disparities were computed by the delta method.

RESULTS

The final study sample consisted of 143,512 patients (Table 2). The most common cancer type was prostate (82,328 patients), followed by cancer of the breast (40,457), lung (11,207), colon (7775), and rectum (1745). Compared with white patients, black cancer patients were significantly more likely to have state buy-in coverage and to reside in areas with the lowest quintile for median income (Table 2). Black patients were significantly more likely to have had no visits to a physician before their cancer diagnosis ($P < .001$ for each pairwise comparison). Black patients tended to have a higher burden of comorbidity for

TABLE 3
Receipt of Cancer Therapy According to Race (1992–2002)

Cancer type & stage (prior therapy)	Therapy	% of Patients receiving therapy		Relative risk of receiving therapy (black vs white)	
		Black	White	Crude	Adjusted
Stage I, II Breast (lumpectomy)	Radiation	77.8	85.8	0.91 (0.87, 0.94)	0.93 (0.90, 0.96)
Stage II, III Breast HR (-) (any resection)	Adjuvant chemotherapy	52.0	53.3	0.98 (0.86, 1.09)	0.99 (0.84, 1.13)
Stage I, II Lung	Resection	64.0	78.5	0.82 (0.77, 0.86)	0.81 (0.76, 0.87)
Stage III Colon	Adjuvant chemotherapy	52.1	64.1	0.81 (0.75, 0.87)	0.76 (0.68, 0.83)
Stage II, III Rectum	(neo) Adjuvant radiation +chemotherapy	35.2	48.9	0.72 (0.57, 0.89)	0.73 (0.55, 0.92)
Stage I Prostate	Definitive therapy	72.4	77.2	0.94 (0.92, 0.95)	0.89 (0.87, 0.90)

Adjusted for age, gender, time period, martial status, region, urbanity, previous physician visits, stage, grade, and comorbid conditions. Relative risks calculated from odds ratios by using Zhang's method. HR indicates hormone receptor (estrogen/progestin); Definitive therapy, prostatectomy, brachytherapy, or external beam radiation therapy for patients with early stage prostate cancer.

all cancer types, with particular differences for diabetes and diabetes with sequelae.

During the full study period, there were racial disparities for 6 of the 7 cancer therapies investigated (Table 3; mastectomy not shown). Among women who had undergone a lumpectomy, black women were less likely to have received radiation therapy (adjusted relative risk [RR], 0.97; 95% CI, 0.94–1.00). There were no racial differences in receipt of adjuvant chemotherapy for women with breast cancer (RR, 1.09; 95% CI, 0.93–1.24). Significant racial disparities were also noted for resection of lung cancer (RR, 0.87; 95% CI, 0.81–0.93), adjuvant therapy for colon cancer (RR, 0.83; 95% CI, 0.75–0.90), adjuvant chemotherapy and (neo)adjuvant radiation for individuals with rectal cancer (RR, 0.75; 95% CI, 0.56–0.95), and definitive therapy for prostate cancer (RR, 0.91; 95% CI, 0.89–0.93).

Therapy rates increased for some cancer care processes during the study period (Table 4). For example, during Period I (1992–1999), the crude rate of adjuvant chemotherapy for breast cancer was 40.1% for whites and 42.4% for blacks, whereas in Period III (2000–2002), the crude therapy rate increased to 61.5% for whites and 65.1% for blacks; this trend was also seen on an adjusted basis as adjusted therapy rates increased from 33.6% to 60.9% for whites and from 38.0% to 65.4% for blacks ($P < .001$). Other changes were more modest. Crude and adjusted therapy rates increased for adjuvant chemotherapy among colon cancer patients and adjuvant chemotherapy with radiation therapy among rectal cancer patients, whereas the effect was smaller for receipt of radiation after a lumpectomy to treat breast cancer. In contrast, therapy rates for lung resection and definitive prostate cancer care showed a downward trend over the same time period.

TABLE 4
Percentage of Patients Receiving Cancer Therapy by Race and Time Period

Patient group	Period I (1992–1994)		Period III (2000–2002)	
	Crude	Adjusted	Crude	Adjusted
Breast: Radiation post-lumpectomy				
White	85.2	85.8	85.3	86.8
Black	78.2	79.7	79.0	81.0
Breast: Adjuvant chemotherapy (HRT-; Stage II/III)				
White	40.1	34.4	61.5	61.6
Black	42.4	33.7	65.1	60.9
Lung: Resection (early stage)				
White	81.9	84.9	75.3	79.3
Black	68.6	73.1	59.8	64.9
Colon: Adjuvant chemotherapy (Stage III)				
White	60.4	61.9	67.0	72.0
Black	46.2	46.2	56.9	57.6
Rectal: (neo)Adjuvant chemo/ radiation therapy (Stage II/III)				
White	44.5	40.3	50.2	49.2
Black	41.0	28.0	41.5	35.8
Prostate: Definitive therapy (localized disease)				
White	81.1	81.7	75.5	77.9
Black	76.4	74.1	70.7	69.3

Adjusted for age, gender, marital status, physician visits, geographic region, cancer stage and grade, and comorbid conditions.HRT-indicates hormone replacement therapy negative.

Racial disparities persisted throughout the study period for most tumor types and process measures even after standardizing by age and other patient factors (Fig. 1). For instance, the adjusted percentage of black women who received radiation after lumpectomy was about 5% lower than that of white women during both Period I and Period III ($P < .005$

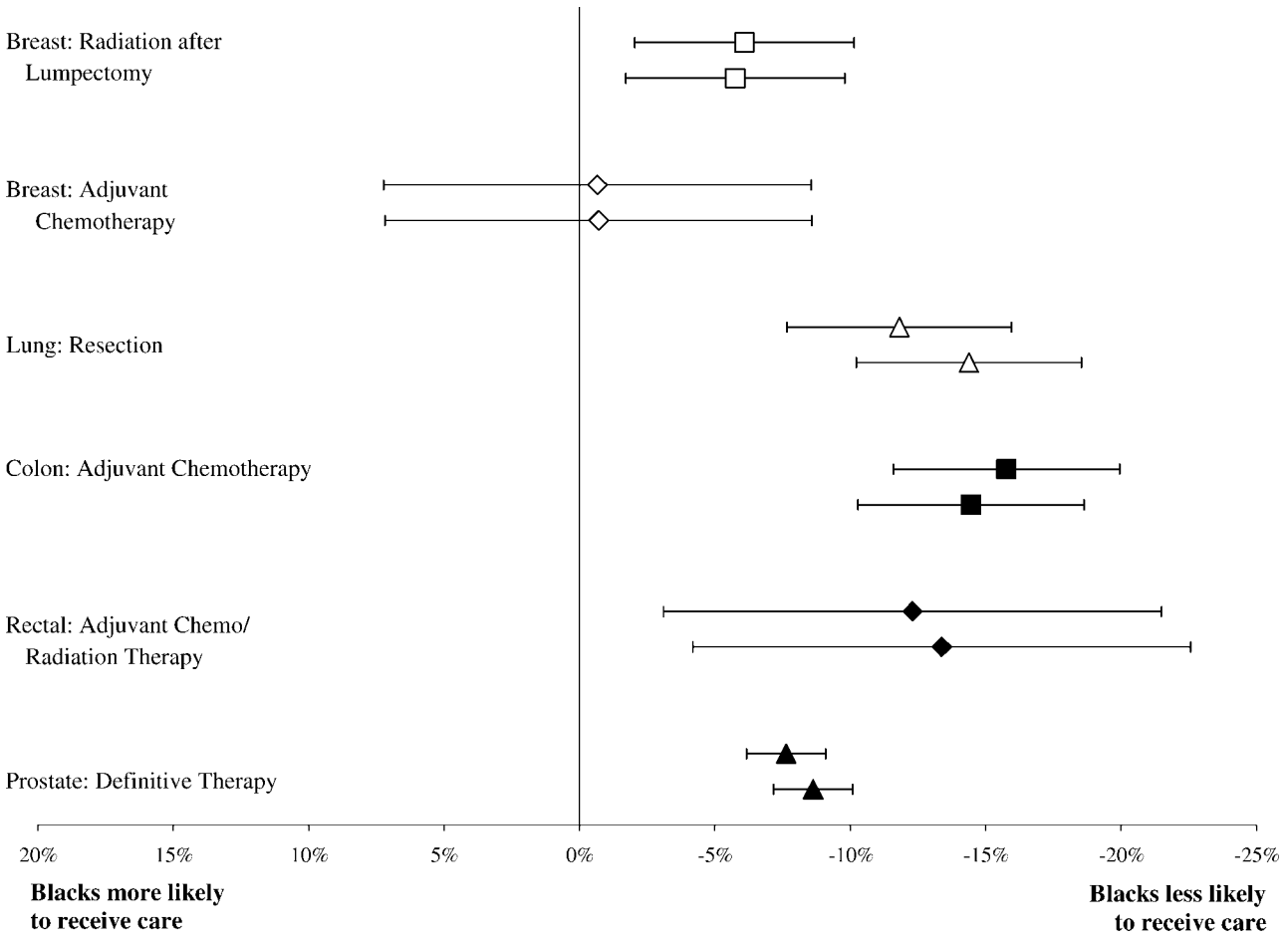

FIGURE 1. Adjusted disparities in absolute rates of receipt of therapy by time period are depicted. For each cancer treatment, the upper symbol represents Period I (1992-4) and the lower symbol represents Period III (2000-2). Disparities are adjusted by standardizing age (at 75 years) and holding the following variables at the distribution in the study sample: sex, marital status, physician visits, geographic region, cancer stage and grade, and comorbid conditions.

for black to white difference in receipt of radiation during each time period). Furthermore, the magnitude of the dispariteiy did not change significantly across time ($P = .67$ for change in magnitude of disparity across time periods). Adjuvant chemotherapy for breast cancer did not show significant disparities in either time period (Period I, $P = .87$; Period III, $P = .86$). In contrast, the other process measures not only had significant racial disparities during both time periods ($P < .01$ for all processes and periods) but also a lack of significant change in the magnitude in the disparities across time. The *P*-value for the race*time interaction term for colon cancer was highly insignificant ($P = .90$), whereas that for rectal cancer, with a trend toward widening the disparity, barely missed achieving significance ($P = .063$). Similarly, the results for lung and prostate cancer also did not support a narrowing of the racial disparity during the study period (*P*-value for race*time interaction terms for lung was .94; for prostate, $P = .16$).

Sequential models were constructed on the subgroup of patients in the final study period (2000–2002, data not shown). Racial disparities were not significantly mitigated by adjusting for age, sex, marital status, geography, or prior visits to a physician (model 1), cancer stage and grade (model 2), or comorbid conditions (model 3). Adjusting for SES (model 4) did narrow the disparity in Period III by 1 to 5 percentage points across the different cancer-care processes. However, disparities persisted in 4 of the 5 treatments with significant disparities noted (adjuvant colon, rectum, and primary lung, prostate treatment) in model 3.

DISCUSSION

We found that the overall utilization of care had not improved substantially for most of the care processes we investigated. Moreover, there was no notable decrease in racial disparities over a 10-year period in

any of the cancer therapies for which a disparity was noted. The inability to close the racial gap in cancer therapy is particularly disappointing given the substantial attention to and investment in identifying and reducing racial disparities in cancer incidence, screening, and outcomes during the study period.[36,37]

There was substantial variation in the unadjusted magnitude of racial disparities across cancer types. The largest disparity—about 15% difference between black and white patients—was noted among patients with early stage lung cancer, for which 76% of white patients and only 60% of black patients underwent surgical resection. The disparity compared with a 2% absolute difference in receipt of adjuvant chemotherapy for breast cancer. This variation suggests that racial disparities in cancer care are unlikely the result of a singular, consistent culprit such as overarching Medicare policies or geographic variation in patterns of care. Rather, the complex relation between race and cancer treatment may vary across cancer types, with differential impact of access to care, bias, cost, and health beliefs or preferences. Future work should determine whether factors that have historically been linked to disparities, such as patient preferences or physician bias, vary across cancer types.

Black patients were substantially more likely than white patients to reside in areas with low median income and to have no documented physician encounters. However, when we constructed sequential models, we found that access and SES did not entirely "explain away" racial disparities in therapy. For the care processes for which disparities were demonstrated, disparities were notable even when the sample was restricted to patients who had had a recent physician encounter. Furthermore, these disparities did not decrease across time for either the low or higher physician access groups, suggesting that there was no specific subgroup that may have benefited from targeted initiatives to decrease disparities.

It is important to note that Medicare data are created to serve an administrative rather than a clinical function and may not accurately capture comorbidity and therapy data. However, prior studies have demonstrated the validity of claims data in identifying the receipt of cancer therapy.[38,39] Furthermore, it is unlikely that the accuracy of claims data with regard to classifying therapy status changed during the time period, particularly in a differential manner between racial groups. It is also reassuring to note that our findings concerning utilization rates from the early 1990s were similar to previously published studies.[9,11,20,40,41] Finally, ecologic measures of SES may misclassify some patients, and given the racial inequities in supplemental coverage among Medicare beneficiaries, the inability to afford out-of-pocket therapy costs and indirect costs may not be fully captured with these data.[42] Furthermore, SES is also affected by factors such as education and community resources that are not captured by income measures.

Our results suggest that racial disparities in cancer care have not lessened over the past 10 years. Our findings are consistent with recent analyses of racial patterns of noncancer care over time, which also note little improvement in disparities.[43–45] Why has there been little improvement? It is notable that, unlike investments in tobacco-reduction and cancer-screening programs, investments in the field of cancer treatment disparities have only recently evolved from documentation and understanding of disparities to assessment of interventions.[46,47] A recent analysis of Medicare HMO data may provide further insight.[48] Unlike other studies of trends in disparities, the authors found a significant decrease in the magnitude of racial disparities between 1998 and 2002. In addition, there was a significant increase in quality for all patients; this overall increase in quality has been suggested as an important factor in reducing disparities.[48,49,50] This is in stark contrast to our findings; not only were disparities persistent, but overall quality, as defined by the receipt of the cancer-care processes we assessed, has not improved. Perhaps a rising tide will raise all boats; future efforts to reduce disparities should be incorporated into a larger quality improvement framework, as our results suggest that all patients would benefit from greater attention to measuring and improving quality of cancer care.[51]

REFERENCES

1. Committee on Cancer Research Among Minorities and the Medically Underserved. The Unequal Burden of Cancer: An Assessment of NIH Research and Programs for Ethnic Minorities and the Medically Underserved. Institute of Medicine; 1999.
2. Shavers VL, Brown ML, Potosky AL, et al. Race/ethnicity and the receipt of watchful waiting for the initial management of prostate cancer. *J Gen Intern Med*. 2004;19:146–155.
3. Ward E, Jemal A, Cokkinides V, et al. Cancer disparities by race/ethnicity and socioeconomic status. *CA Cancer J Clin*. 2004;54:78–93.
4. Bach PB, Cramer LD, Warren JL, Begg CB. Racial differences in the treatment of early-stage lung cancer. *N Engl J Med*. 1999;341:1198–1205.
5. Bradley CJ, Given CW, Roberts C. Race, socioeconomic status, and breast cancer treatment and survival. *J Natl Cancer Inst*. 2002;94:490–496.
6. Shavers VL, Brown ML. Racial and ethnic disparities in the receipt of cancer treatment. *J Natl Cancer Inst*. 2002;94:334–357.

7. Harlan LC, Clegg LX, Trimble EL. Trends in surgery and chemotherapy for women diagnosed with ovarian cancer in the United States. *J Clin Oncol*. 2003;21:3488–3494.
8. Schrag D, Gelfand SE, Bach PB, Guillem J, Minsky BD, Begg CB. Who gets adjuvant treatment for stage II and III rectal cancer? Insight from surveillance, epidemiology, and end results–Medicare. *J Clin Oncol*. 2001;19:3712–3718.
9. Schrag D, Cramer LD, Bach PB, Begg CB. Age and adjuvant chemotherapy use after surgery for stage III colon cancer. *J Natl Cancer Inst*. 2001;93:850–857.
10. Baldwin LM, Dobie SA, Billingsley K, et al. Explaining black-white differences in receipt of recommended colon cancer treatment. *J Natl Cancer Inst*. 2005;97:1211–1220.
11. Haggstrom DA, Quale C, Smith-Bindman R. Differences in the quality of breast cancer care among vulnerable populations. *Cancer*. 2005;104:2347–2358.
12. Wingo PA, Ries LA, Rosenberg HM, Miller DS, Edwards BK. Cancer incidence and mortality, 1973–1995: a report card for the U.S. *Cancer*. 1998;82:1197–1207.
13. NCI Plan and Budget Proposal for Fiscal Year 2007. Bethesda, Md: National Cancer Institute; 2006.
14. Trans-HHS Cancer Health Disparities Progress Review Group. Making Cancer Health Disparities History. Washington, DC: U.S. Department of Health and Human Services; 2004.
15. Kennedy EM. The role of the federal government in eliminating health disparities. *Health Aff (Millwood)*. 2005;24:452–458.
16. Mitka M. Initiative seeks answers to cancer disparities. *JAMA*. 2000;283:2092–2093.
17. Underwood W 3rd, Jackson J, Wei JT, et al. Racial treatment trends in localized/regional prostate carcinoma: 1992–1999. *Cancer*. 2005;103:538–545.
18. Underwood W, De Monner S, Ubel P, Fagerlin A, Sanda MG, Wei JT. Racial/ethnic disparities in the treatment of localized/regional prostate cancer. *J Urol*. 2004;171:1504–1507.
19. Zeliadt SB, Potosky AL, Etzioni R, Ramsey SD, Penson DF. Racial disparity in primary and adjuvant treatment for nonmetastatic prostate cancer: SEER-Medicare trends 1991 to 1999. *Urology*. 2004;64:1171–1176.
20. Jessup JM, Stewart A, Greene FL, Minsky BD. Adjuvant chemotherapy for stage III colon cancer: implications of race/ethnicity, age, and differentiation. *JAMA*. 2005;294:2703–2711.
21. Ries L, Eisner M, Kosary C, et al. SEER Cancer Statistics Review, 1975–2003. In: http://seer.cancer.gov/csr/1975_2003/ based on November 2005 SEER data submission, posted to the SEER web site, 2006, vol. 2006. Bethesda, Md: National Cancer Institute; 2006.
22. NIH consensus conference. Adjuvant therapy for patients with colon and rectal cancer. *JAMA*. 1990;264:1444–1450.
23. Blichert-Toft M, Rose C, et al. Danish randomized trial comparing breast conservation therapy with mastectomy: six years of life-table analysis. Danish Breast Cancer Cooperative Group. *J Natl Cancer Inst Monogr*. 1992:19–25.
24. Muggia F, ed. National Cancer Institute: Physician Data Query. Available from http://www.cancer.gov/cancertopics/pdq. Accessed on November 1, 2007.
25. Sarrazin D, Le MG, Arriagada R, et al. Ten-year results of a randomized trial comparing a conservative treatment to mastectomy in early breast cancer. *Radiother Oncol*. 1989;14:177–184.
26. van Dongen JA, Bartelink H, Fentiman IS, et al. Randomized clinical trial to assess the value of breast-conserving therapy in stage I and II breast cancer, EORTC 10801 trial. *J Natl Cancer Inst Monogr*. 1992:15–18.
27. Ayanian JZ, Zaslavsky AM, Fuchs CS, et al. Use of adjuvant chemotherapy and radiation therapy for colorectal cancer in a population-based cohort. *J Clin Oncol*. 2003;21:1293–1300.
28. Lathan CS, Neville BA, Earle CC. The effect of race on invasive staging and surgery in non-small-cell lung cancer. *J Clin Oncol*. 2006;24:413–418.
29. Mandelblatt JS, Kerner JF, Hadley J, et al. Variations in breast carcinoma treatment in older medicare beneficiaries: is it black or white. *Cancer*. 2002;95:1401–1414.
30. Neugut AI, Fleischauer AT, Sundararajan V, et al. Use of adjuvant chemotherapy and radiation therapy for rectal cancer among the elderly: a population-based study. *J Clin Oncol*. 2002;20:2643–2650.
31. Voti L, Richardson LC, Reis I, Fleming LE, Mackinnon J, Coebergh JW. The effect of race/ethnicity and insurance in the administration of standard therapy for local breast cancer in Florida. *Breast Cancer Res Treat*. 2006;95:89–95.
32. Bach PB, Guadagnoli E, Schrag D, Schussler N, Warren JL. Patient demographic and socioeconomic characteristics in the SEER-Medicare database applications and limitations. *Med Care* 2002;40(8 suppl):IV-19–25.
33. Klabunde CN, Potosky AL, Legler JM, Warren JL. Development of a comorbidity index using physician claims data. *J Clin Epidemiol*. 2000;53:1258–1267.
34. Keating NL, Landrum MB, Ayanian JZ, Winer EP, Guadagnoli E. The association of ambulatory care with breast cancer stage at diagnosis among Medicare beneficiaries. *J Gen Intern Med*. 2005;20:38–44.
35. Smedley BD, Stith AY, Nelson AR. Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care. Washington, DC: National Academy Press; 2003.
36. Department of Health and Human Services, Centers for Disease Control and Prevention. http://www.cdc.gov/tobacco/tobacco_control_programs/stateandcommunity/index.htm#about Atlanta, Ga: Centers for Disease Control and Prevention; 2006. Accessed on November 1, 2007.
37. Department of Health and Human Services. Centers for Disease Control and Prevention. National Breast and Cervical Cancer Early Detection Program, 1991–2002 National Report. Available at: http://www.cdc.gov/cancer/nbccedp/bccpdfs/national_report.pdf Atlanta, Ga: Centers for Disease Control and Prevention.
38. Lamont EB, Herndon JE 2nd, Weeks JC, et al. Criterion validity of Medicare chemotherapy claims in Cancer and Leukemia Group B breast and lung cancer trial participants. *J Natl Cancer Inst*. 2005;97:1080–1083.
39. Lamont EB, Lauderdale DS, Schilsky RL, Christakis NA. Construct validity of medicare chemotherapy claims: the case of 5FU. *Med Care*. 2002;40:201–211.
40. Bach PB, Schrag D, Brawley OW, Galaznik A, Yakren S, Begg CB. Survival of blacks and whites after a cancer diagnosis. *JAMA*. 2002;287:2106–2113.
41. Sundararajan V, Mitra N, Jacobson JS, Grann VR, Heitjan DF, Neugut AI. Survival associated with 5-fluorouracil-based adjuvant chemotherapy among elderly patients with node-positive colon cancer. *Ann Intern Med*. 2002;136:349–357.
42. Super N. Medigap: Prevalence, Premiums, and Opportunities for Reform. In: National Health Policy Forum. NHPF Issue Brief No.782, September 9, 2002. Available at: http://www.nhpf.org/pdfs_ib/IB782_Medigap_9-9-02.pdf#search=%22medigap%20use%20by%20race%22
43. Jha AK, Fisher ES, Li Z, Orav EJ, Epstein AM. Racial trends in the use of major procedures among the elderly. *N Engl J Med*. 2005;353:683–691.

44. Vaccarino V, Rathore SS, Wenger NK, et al. Sex and racial differences in the management of acute myocardial infarction, 1994 through 2002. *N Engl J Med*. 2005;353:671–682.
45. Satcher D, Fryer GE Jr, McCann J, Troutman A, Woolf SH, Rust G. What if we were equal? A comparison of the black-white mortality gap in 1960 and 2000. *Health Aff (Millwood)*. 2005;24:459–464.
46. Dohan D, Schrag D. Using navigators to improve care of underserved patients: current practices and approaches. *Cancer*. 2005;104:848–855.
47. National Cancer Institute. NCI Awards $25 Million for Patient Navigator Research Program for Minority and Underserved Cancer Patients. Posted October 27, 2005 to: http://www.cancer.gov/newscenter/pressreleases/PatientNavigatorGrants
48. Trivedi AN, Zaslavsky AM, Schneider EC, Ayanian JZ. Trends in the quality of care and racial disparities in Medicare managed care. *N Engl J Med*. 2005;353:692–700.
49. Fiscella K, Franks P, Gold MR, Clancy CM. Inequality in quality: addressing socioeconomic, racial, and ethnic disparities in health care. *JAMA*. 2000;283:2579–2584.
50. Lurie N. Health disparities—less talk, more action. *N Engl J Med*. 2005;353:727–729.
51. Malin JL, Schneider EC, Epstein AM, Adams J, Emanuel EJ, Kahn KL. Results of the National Initiative for Cancer Care Quality: how can we improve the quality of cancer care in the United States? *J Clin Oncol*. 2006;24:626–634.
52. Roetzheim RG, Gonzalez EC, Ferrante JM, Pal N, Van Durme DJ, Krischer JP. Effects of health insurance and race on breast carcinoma treatments and outcomes. *Cancer*. 2000;89:2202–2213.
53. Du XL, Osborne C, Goodwin JS. Population-based assessment of hospitalizations for toxicity from chemotherapy in older women with breast cancer. *J Clin Oncol*. 2002;20:4636–4642.
54. Klabunde CN, Potosky AL, Harlan LC, Kramer BS. Trends and black/white differences in treatment for nonmetastatic prostate cancer. *Med Care*. 1998;36:1337–1348.