

# Race/Ethnicity and the Intensity of Medical Monitoring Under 'Watchful Waiting' for Prostate Cancer

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**Background:** Previous studies have found that racial/ethnic minority patients with prostate cancer are more frequently managed with "watchful waiting." Little, however, is known about the medical care received among men managed with watchful waiting. We examine the type and intensity of medical monitoring received by African American, Hispanic, and white patients with prostate cancer managed with "watchful waiting" in fee-for-service systems.

**Methods:** Surveillance Epidemiology and End Results–Medicare data for men diagnosed with prostate cancer 1994–1996 were used in this study. Men were determined to have initially received watchful waiting if they did not receive surgery, radiation, or hormone treatment within the first 7 months of diagnosis. Crosstabulations, multivariate logistic, and Cox regressions were used to examine the association between clinical and sociodemographic variables and the receipt of a primary care, urology visit, prostate-specific antigen test, or bone scan.

**Results:** In general, Hispanic and African American men received less medical monitoring and had longer median times from diagnosis to receipt of a medical monitoring visit or procedure than white men. Furthermore, nearly 6% of African American, 5% of Hispanic, and 1% of white men did not have any medical monitoring visits or procedures during the 60-month follow-up period ( $P < 0.001$ ). Differences in observed clinical or sociodemographic characteristics did not explain variations in medical monitoring.

**Conclusion:** Regular medical monitoring is considered by most medical authorities to be a necessary component of management

with watchful waiting. The disproportionately low receipt of medical monitoring visits and procedures observed for African American and Hispanic men managed with watchful waiting in this study suggest that there are racial/ethnic disparities in the receipt of appropriate prostate cancer management.

**Key Words:** race, ethnicity, treatment, disparities, prostate cancer  
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Prostate cancer is diagnosed in more than 221,000 U.S. men annually<sup>1</sup> a disproportionate number of which are African Americans who account for nearly 13% of new prostate cancer cases and have the highest age-adjusted prostate cancer incidence in the world.<sup>2</sup> Deaths among African Americans comprise more than 19% of the prostate cancer deaths that occur among U.S. men each year.

Increased utilization of prostate-specific antigen (PSA) testing to screen for prostate cancer has increased the number of men who are diagnosed with early and, in some cases, clinically insignificant disease. Current prostate cancer treatments can have side effects, including impotence, urinary incontinence, urethral stricture, acute cystitis, impotence, enteritis, loss of libido, hot flashes, gynecomastia, and psychological effects. Furthermore, the potential tradeoff between definitive treatment and quality of life<sup>3,4</sup> has not been demonstrated to improve overall survival in randomized, controlled trials.<sup>5,6</sup> Consequently, the definition of appropriate prostate cancer therapy remains somewhat controversial,<sup>7,8</sup> particularly for early-stage cancers.

Uncertainty about the benefit of definitive treatment underlies the decision of many patients with early-stage prostate cancer to be initially managed with "watchful waiting" in lieu of definitive treatment such as surgery or radiation. Compared with white men, African American and Hispanic men more frequently receive watchful waiting after adjustment for clinical and demographic characteristics in multivariate models.<sup>9</sup> Other research show that African Americans are also more likely than whites to go untreated

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ed<sup>7,10–12</sup> and are less likely to receive a definitive treatment,<sup>13</sup> including radical prostatectomy.<sup>7,10,11,14–16</sup>

Approximately 52% of patients with prostate cancer managed with “watchful waiting” have disease progression within 5 years of diagnosis and require secondary treatment.<sup>17,18</sup> In theory, men managed with “watchful waiting” receive regular medical monitoring, including PSA tests and digital rectal exams (DRE), but do not receive treatment until there is evidence of disease progression or the patient become symptomatic,<sup>19</sup> thus avoiding the side effects associated with definitive treatment. When men are followed regularly, local and/or biochemical disease progression can be detected early with PSA testing and DRE. The National Comprehensive Cancer Network recommends a clinical evaluation to assess disease progression or symptom development every 6 to 12 months if life expectancy is <10 years and a PSA and DRE every 6 months if it is 10 years or more.<sup>19</sup> Regular medical monitoring of patients with prostate cancer managed with watchful waiting is also recommended by the 1995 Michigan Prostate Cancer Consensus Conference<sup>20</sup> and is included in the description of watchful waiting by many organizations.<sup>21–24</sup>

Given the large proportion of men who develop progressive disease, the disproportionate number of African American men who are managed with “watchful waiting,” and the disproportionate mortality observed among African American men, it is important to determine whether “watchful waiting,” as currently practiced, represents active medical monitoring, or the failure to receive appropriate medical management.

The current study examines the type and intensity of medical monitoring received among African American, Hispanic, and white men age 65 or older managed with “watchful waiting” within fee-for-service systems. We were specifically interested in answering the following questions: 1) Are there racial/ethnic differences in the intensity of medical monitoring under watchful waiting? 2) If so, for what medical monitoring procedures or visits do these differences exist? 3) What factors contribute to racial/ethnic differences in the intensity of medical monitoring?

## METHODS

We examined Surveillance Epidemiology and End Results (SEER)–Medicare data for men newly diagnosed with prostate cancer from January 1, 1994, through December 31, 1996, and followed to December 31, 1999. SEER cancer registry data were linked with Medicare claims data in the manner described in detail elsewhere.<sup>25</sup>

### Inclusion/Exclusion Criteria

Individuals included in this study were African American, Hispanic, or white men diagnosed with prostate cancer during 1994–1996 reported to the SEER registries who were

initially managed with watchful waiting. Eligible men were age 65 or older, had continuous Medicare Part A & B coverage, were not enrolled in an HMO, had a known month of diagnosis, lived 6 months or more after diagnosis, and were not diagnosed by death certificate or at autopsy. Men were determined to have received watchful waiting as initial treatment of their prostate cancer if they did not receive surgery, radiation, or hormone treatment within the first 6 months after the month of diagnosis using SEER and Medicare claims data.

There were 49,901 men diagnosed with a new primary prostate cancer reported to SEER during 1994–1996. The most frequent reason men were excluded was because they received treatment within the first 6 months after their month of diagnosis and thus were not deemed to have been initially managed with watchful waiting ( $n = 21,261$ ). In addition, 10,784 men were excluded because they did not receive fee-for-service care (ie, were enrolled in HMOs), 7595 because they were not 65 years of age or older at diagnosis, 2911 because they did not have continuous Medicare Part A & B coverage, 729 who died within the first 6 months after the month of diagnosis, 610 who were diagnosed by autopsy or death certificate, and 277 were excluded because an accurate month of diagnosis could not be ascertained. A total of 44,167 men were excluded, leaving a final cohort of 5734 men. Overall, 47.1% of white, 59.2% of African American, and 68.2% of Hispanic men were excluded ( $P < 0.001$ ). Of men eligible to participate in this study, 12.1% were African American, 4.8% white Hispanic (Hispanic), and 83.1% were non-Hispanic white (NHW) men (Table 1).

### Stage

SEER historic stage is used to examine racial/ethnic variation in stage at diagnosis. SEER AJCC Stage was not used because of changes in prostate cancer coding, which resulted in a large proportion of unstaged/unknown stage cancers. Data used to stage prostate cancer can come from clinical or pathologic examinations. Because many men are not treated with surgery, staging frequently relies on information that is obtained clinically. Starting in 1995, local and regional stage prostate cancers were combined into one category to account for the upstaging that would likely occur if all clinically determined local-stage prostate cancers were surgically staged. In a recent study, nearly 74% of clinically staged cases were upstaged after surgery.<sup>26</sup> We present stage data for men diagnosed in 1994 as in situ (noninvasive), localized (confined to prostate), regional (regional spread), distant (distant metastasis), and unstaged. Local- and regional-stage disease are combined into one category for men diagnosed 1995–1996.

### Life Expectancy

Life expectancies were obtained from race-/ethnic-specific lifetables for the U.S. population for 1998.<sup>27</sup>

**TABLE 1.** Characteristics of Men Initially Treated With Watchful Waiting for Prostate Cancer, SEER-Medicare 1994–1996

	African American (n = 676; percent)	White Hispanic (n = 262; percent)	White Non-Hispanic (n = 4796; percent)	P Value
<b>Demographic characteristics</b>				
Age (yr)				
Mean	75.9	76.1	77.1	<0.0001
Median	75	75	77	<0.0001
Education (percent of persons in census tract who did not complete high school)	n = 578	n = 167	n = 4074	
20% or less	4.9	7.6	28.5	
20.01–40.0%	32.7	27.5	45.8	<0.001
40.01% or more	47.9	28.6	10.7	
Unknown	14.5	36.3	15.0	
Percent of persons in census tract who did not complete high school for individuals with known census tracts				
Mean	43.1	37.8	25.8	<0.0001
Median	43.8	36.6	25.0	<0.0001
Income (household income of census tract)				
<\$10,000	4.9	0.4	0.2	
\$10,000–25,000	44.8	42.0	15.3	
\$25,001–40,000	29.1	13.7	39.0	<0.001
\$40,000 or more	6.7	7.6	30.5	
Unknown	14.5	36.3	15.0	
	n = 578	n = 167	n = 4074	
Median household income of census tracts for individuals with known census tracts	22,747	20,506	34,380	<0.0001
Marital status				
Single	16.7	9.2	7.7	
Married	46.0	59.5	63.6	
Divorced	9.8	5.0	3.5	<0.0001
Separated	0.7	1.5	0.2	
Widowed	17.8	13.7	12.6	
Unknown	9.0	11.1	12.4	
SEER region				
Atlanta, GA, SMSA	12.9	0	5.1	
Connecticut	5.0	3.4	14.7	
Detroit, MI, SMSA	53.1	2.3	16.8	
Hawaii	0	0	0.7	<0.001
Iowa	1.5	0.8	17.1	
Los Angeles	12.9	29.4	10.2	
San-Jose Monterey	0.6	6.5	3.0	
New Mexico	0.9	45.0	6.0	
San Francisco-Oakland, CA	9.6	7.6	6.4	
Seattle-Puget Sound	2.8	1.2	12.4	
Utah	0.7	3.8	7.8	
<b>Clinical characteristics</b>				
SEER historic stage				
In situ	0.4	0.4	0.4	
Local (1994)	25.7	37.8	26.2	
Regional (1994)	2.5	1.5	1.9	0.0005
Distant	2.8	2.3	1.4	
Local + regional (1995–1996)	49.3	46.2	52.3	
Unstaged/unknown stage	19.2	11.8	17.9	

(continues)

TABLE 1. (Continued)

	African American (n = 676; percent)	White Hispanic (n = 262; percent)	White Non-Hispanic (n = 4796; percent)	P Value
Grade				
Well-differentiated	16.0	34.4	28.9	
Moderately differentiated	52.1	40.1	49.1	
Poorly/undifferentiated	14.2	11.1	8.6	<0.0001
Unknown grade	17.8	14.5	13.4	
Life expectancy at time of diagnosis				
<5 years	5.3	8.8	8.1	
5–<10 years	54.6	38.6	49.6	0.0001
10+ years	40.1	52.7	42.3	
Comorbidity				
Prevalence of selected comorbid conditions				
Inpatient				
Acute myocardial infarction	1.0	0.4	1.2	0.030
Congestive heart failure	4.1	3.8	3.9	0.051
Chronic obstructive pulmonary disease	5.8	3.4	5.2	0.035
Dementia	1.8	0.4	1.0	0.020
Diabetes with complications	0.6	1.2	0.4	0.019
Outpatient				
Acute myocardial infarction	0.2	0	0.2	<0.001
Congestive heart failure	5.6	3.8	3.4	<0.001
Chronic obstructive pulmonary disease	5.9	4.6	6.6	<0.001
Dementia	0.6	0	0.4	<0.001
Diabetes with complications	0.6	0.4	0.3	<0.001

The census variables were coded as unknown when a census tract was not found in the NPDC file or when the tract number provided was invalid. These values were removed for the purpose of some analyses, which caused the n counts to change.

## Socioeconomic Status

Socioeconomic data were obtained from the 1990 Census of the U.S. Population. These included educational data measured as the percent of residents aged 25 and older with less than a high school education and median household income of the census tract in which each patient resided. Data were linked using the census tract of the patient's residence at the time of diagnosis.

## Intensity of Medical Monitoring

To examine the intensity of medical monitoring, we compared the frequency of primary care visits, urology visits, PSA testing, and bone scans and time to receipt of a specific medical monitoring procedure or visit. Medical monitoring procedures and visits were examined for the period beginning 6 months past the month of diagnosis unless otherwise indicated.

The time to receipt of the first primary care or urology visit and to the receipt of the first PSA test or bone scan was calculated as the time in months from the date of the first positive biopsy to the receipt of the first visit or procedure. Individuals who did not receive a specific procedure or visit or who were treated before receiving the procedure or visit

were not included in the calculation of the time to receipt of that specific procedure or medical monitoring visit.

## Comorbidity

We first developed indicator variables for 5 chronic conditions identified by a panel of 5 urologists in an informal survey as those that were likely to influence prostate cancer treatment recommendations. These include myocardial infarction within the 6-month period before diagnosis (AMI) and a history of congestive heart failure (CHF), diabetes with complications (DM), chronic obstructive pulmonary disease (COPD), and dementia (DEM). We then developed 2 comorbidity indices based on an algorithm developed by the National Cancer Institute for use with SEER-Medicare data.<sup>28</sup> The indices were computed as 2 weighted summary comorbidity scores, one for inpatient conditions and one for outpatient conditions, based on inpatient claims and outpatient physician claims, respectively, for the 12-month period before diagnosis (except AMI). This methodology has been demonstrated to provide more complete ascertainment of comorbid conditions.<sup>28</sup> The algorithm is based on the Charlson index and only includes conditions identified by Charlson et al.<sup>29</sup> as being of prognostic importance. For this study, the

2 indices did not include the conditions represented by the 5 indicator variables. The 7 comorbidity measures (ie, inpatient and outpatient indices and the indicator variables for the 5 selected conditions) were used to examine the association of comorbidity on the receipt of medical monitoring services and visits.

### Statistical Methods

The chi-squared test for homogeneity of proportions is used to evaluate the significance of differences in the distribution of categorical variables. The Student *t* test and the analysis of variance (ANOVA) are used to evaluate the significance of racial/ethnic differences in the mean and the Wilcoxon rank sum test for the medians of continuous variables. Cox's regression is used to examine the association between the independent variables and the time to a selected medical monitoring test or visit (ie, primary care, urology, PSA test). For the Cox regression models, men were followed from diagnosis until the first receipt of a specific procedure or visit or until December 31, 1999, whichever came first. Men who died or were treated before receiving a specific test or procedure were censored at the time of their death or treatment in all regression analyses involving that test or procedure. Logistic regression is used to examine the receipt of at least one PSA test. A statistical significance level of 0.05 is used for all analyses. Data analyses were performed with SAS.<sup>30</sup> The median follow-up time in months was 45 for African American, 50 for Hispanic, and 47 for white men.

## RESULTS

### Demographic Characteristics

The distribution of demographic characteristic varied between the 3 racial/ethnic groups (Table 1). African American men had significantly lower median ages at diagnosis, were less frequently married, and more frequently lived in census tracts where more than 40% of the residents had not completed high school than Hispanic and white men. African American and Hispanic men more frequently lived in census tracts with median annual income of \$25,000 or less ( $P < 0.001$ ). Socioeconomic data were missing for 14.5% of African American, 36.3% of Hispanic, and 15.0% of white men whose census tracts could not be matched to the 1991 National Planning Data Corporation file.<sup>31</sup>

### Clinical Characteristics

African American and Hispanic men managed with "watchful waiting" differed significantly from whites in the distribution of stage, grade, and life expectancy (Table 2). African American men more frequently had distant-stage disease, had a higher proportion of poorly/undifferentiated and unknown grade tumors than both Hispanic and white men. Nearly 60% of African Americans had a life expectancy of less than 10 years at the time of diagnosis compared with

47.4% of Hispanics and 57.7% of whites. The overall prevalence of one or more comorbid condition was higher for African American men than white and Hispanic men. There were also statistically significant differences in the prevalence of the 5 comorbid conditions felt to be the most likely to influence treatment.

### Receipt of Medical Monitoring Visits and Procedures

There was racial/ethnic variation in the number and timing of medical monitoring visits and procedures (Tables 3 and 4). In general, African American and Hispanic men were significantly less likely to receive medical monitoring and when received had a lower median number of visits and had longer median times from diagnosis to receipt of monitoring visits or procedures. Nearly 6% of African American, 4.5% of Hispanic, and 1.2% of white men who survived and remained untreated throughout the 60-month period after diagnosis did not have any medical monitoring visits or procedures ( $P < 0.001$ ).

### Primary Care Visits

African American and Hispanic less frequently had a visit with a primary care physician during the 7- to 60-month interval postdiagnosis than white men (Table 3). Although African American and Hispanic men had a lower median number of visits than white men who received them, there was no significant difference in the mean number of visits (data not presented). The median time from diagnosis to the first primary care visit was shorter for African American than Hispanic and white men (Table 4).

In a multivariate Cox regression model, African American (HR, 0.83; 95% confidence interval [CI], 0.76–0.92) and Hispanic men (HR, 0.82; 95% CI, 0.72–0.94) had a significantly lower probability of having a primary care visit compared with white men after adjusting for stage, grade, comorbidity, education, income, and marital status (Table 5). Grade, comorbidity, education, and marital status also had a significant independent association with having a primary care visit after adjustment. The odds of having a primary care visit were lower among men with moderately or poorly/undifferentiated tumors and with life expectancies of 5 years or more. Men with CHF or COPD had an increased probability of having a primary care visit compared with men without these conditions. Each one-unit increase in the inpatient or outpatient comorbidity score was associated with a 40% and 64% increase in the probability of having a primary care visit, respectively.

### Urology Visits

Overall, African American and Hispanic men had fewer visits with an urologist in the 7- to 60-month period postdiagnosis than white men (Table 3). Thirty-six percent of African American, 24% of Hispanic, and 18% of white men

**TABLE 2.** Medical Monitoring Visits and Procedures Received by Men Who Initially Received Watchful Waiting for Prostate Cancer Stratified by Race/Ethnic Group and Time Interval, SEER-Medicare, 1994–1999

Procedure	7–24 Months Postdiagnosis				25–60 Months Postdiagnosis				7–60 Months Postdiagnosis			
	African (n = 519)	Hispanic (n = 214)	White (n = 4007)	P Value	African (n = 121)	Hispanic (n = 69)	White (n = 970)	P Value	African (n = 121)	Hispanic (n = 69)	White (n = 970)	P Value
Primary care visits												
0	31.79	26.64	18.64		26.45	21.74	11.65		19.83	17.39	7.53	
1	6.55	14.02	7.31		6.61	8.70	5.26		4.96	7.25	4.12	
2	5.20	7.48	7.04		1.65	4.35	4.33		1.65	4.35	2.68	
3	3.08	4.67	5.81		6.61	2.90	3.92		3.31	1.45	3.40	0.0022
4	3.66	4.21	5.99	<0.0001	1.65	5.80	4.23	0.0014	4.13	5.80	2.58	
5–8	14.45	18.69	20.86		8.26	7.25	14.12		6.61	7.25	10.62	
9–12	11.56	6.54	13.28		8.26	10.14	11.44		9.09	8.70	10.93	
13+	23.70	17.76	21.06		40.50	39.13	45.05		50.41	47.83	58.14	
Median	4	3	5	<0.0001	8	7	11	0.0250	13	12	16	0.0367
Urology visits												
0	47.01	35.51	28.67		43.80	39.13	24.85	0.0024	36.36	24.64	17.84	
1	7.32	12.62	9.81		8.26	11.59	6.19		6.61	8.70	5.57	
2	7.90	8.88	11.33		4.13	2.90	6.19		4.13	4.35	4.02	
3	6.74	8.88	15.05		4.96	4.35	6.39		4.13	2.90	3.61	
4	4.82	8.41	9.63	<0.0001	4.96	4.35	5.36		2.48	5.80	4.95	0.0048
5–8	14.26	16.82	17.27		14.05	20.29	23.51		12.40	20.29	19.28	
9–12	6.17	4.21	5.24		9.09	7.25	15.05		14.05	15.94	15.26	
13+	5.78	4.67	2.99		10.74	10.14	12.47		19.83	17.39	29.48	
Median	1	2	3	<0.0001	1	1	5	<0.0001	3	5	7.5	0.0003
Prostate-specific antigen (PSA) tests												
0	40.08	41.59	24.66		33.06	33.33	17.73	<0.0001	29.75	20.29	11.96	
1–4	47.40	50.47	64.54		28.10	47.83	41.13		23.14	46.38	26.91	
5–8	10.02	7.48	10.08	<0.0001	26.45	14.49	30.62		15.70	21.74	29.79	<0.0001
9–12	1.93	0.47	0.65		8.26	2.90	8.76		16.53	7.25	20.82	
13+	0.58	0.00	0.07		4.13	1.45	1.75		14.88	4.35	10.52	
Median	1	1	2	<0.0001	2	1	4	<0.0001	4	3	6	<0.0001

Note: n represents the number of patients alive and did not receive any treatment at the end of the time interval.

did not see an urologist during the interval 7 to 60 months postdiagnosis. African American and Hispanic men had a significantly lower median number of urology visits than white men, although the means were not significantly different (data not presented). Although African American and Hispanic men had longer mean time from diagnosis to their first urology visits, there was no significant difference in the median (Table 4).

In multivariate Cox regression analyses, African American men (HR, 0.82; 95% CI, 0.74–0.90) had a lower probability of being seen by an urologist after controlling for stage, grade, age, comorbidity, education, income, and marital status (Table 5). Men with distant-stage disease or un-

known grade had a lower probability of being seen by an urologist as did men with dementia, incomes less than \$30,000, or who were single or divorced after adjustment for other variables in the model.

### Prostate-Specific Antigen Testing

Receipt of PSA testing also significantly varied by race/ethnic group (Tables 3 and 4). Overall, 29.8% of African Americans, 20.3% of Hispanics, and 12.0% of whites did not receive a PSA test during the 7- to 60-month interval after their prostate cancer diagnosis. African American and Hispanic men had a significantly lower overall mean and median number of

**TABLE 3.** Medical Monitoring Visits and Procedures Received by Men Who Initially Received Watchful Waiting for Prostate Cancer Stratified by Race/Ethnic Group and Time Interval, SEER-Medicare, 1994–1999

Procedure	7–24 Months Postdiagnosis				25–60 Months Postdiagnosis				7–60 Months Postdiagnosis			
	African American	Hispanic	White	P Value	African American	Hispanic	White	P Value	African American	Hispanic	White	P Value
Bone scans												
0	79.77	85.05	87.02		69.42	86.96	81.03		62.81	75.36	73.20	
1	15.22	12.15	10.63		23.97	13.04	13.09		23.14	17.39	18.45	
2	4.82	1.87	1.85		4.13	0.00	5.15	0.0085	5.79	5.80	5.77	0.0164
3	0.19	0.93	0.35	<0.0001	1.65	0.00	0.62		4.13	1.45	1.86	
4 or more	0.00	0.00	0.15		0.83	0.00	0.10		4.13	0.00	0.72	
Median	0	0	0	<0.0001	0	0	0	0.0041	0	0	0	0.0266
Transrectal												
ultrasounds	88.44	88.32	88.20		80.99	85.51	83.20		75.21	78.26	75.88	
0	9.06	6.07	8.46		14.05	5.80	11.75		14.88	11.59	13.81	
1	1.93	3.74	2.10		3.31	4.35	2.99	0.0209	6.61	2.90	5.05	0.5151
2	0.39	1.40	0.65	0.4185	0.00	0.00	1.55		0.00	1.45	2.58	
3	0.19	0.47	0.60		1.65	4.35	0.52		3.31	5.80	2.68	
4 or more												
Median	0	0	0	0.9706	0	0	0	0.7947	0	0	0	0.9351

Note: n represents the number of patients alive and did not receive any treatment at the end of the time interval.

**TABLE 4.** Timing of Medical Monitoring Services Among Men Initially Treated With Watchful Waiting for Prostate Cancer, SEER 1994–1996

	African American	White Hispanic	White Non-Hispanic	P Value
Months from diagnosis to first primary care visit	n = 577	n = 229	n = 4415	
Mean	7.5	8.7	6.7	0.0029
Median	2	4	3	0.0014
Months from diagnosis to first visit with urologist	n = 491	n = 218	n = 4041	
Mean	6.0	6.7	5.0	0.0017
Median	2	2	2	0.5980
Months from diagnosis to first prostate-specific antigen determination	n = 455	n = 199	n = 3856	
Mean	9.9	12.7	8.2	<0.0001
Median	5	7	5	<0.0004
Months from diagnosis to first bone scan	n = 322	n = 108	n = 1713	
Mean	10.8	14.8	13.6	0.0074
Median	3	9	6	0.0566
Months from diagnosis to initiation of first cancer-directed treatment	n = 28	n = 10	n = 102	
Mean	7.5	7.5	7.4	0.5369
Median	8	7.5	7	0.5336

Changes in sample sizes reflect missing data. Men who received treatment before or in the same month as the procedure or visit and persons who did not receive the procedure or visit or who died before they received a procedure or visit are not included in this analysis.

PSA tests than whites during the follow-up period as a whole. The mean number of tests among men who received at least one PSA test, however, was higher for Hispanic and African American men than white men. Hispanic men also had a longer mean

time from diagnosis to receipt of PSA testing than both African American and white men (Table 4).

In a multivariate Cox's regression model, factors that were significantly associated with the overall probability of

**TABLE 5.** Cox's Regression Analysis of the Time to Receipt of Selected Medical Visits and Monitoring Procedures Among Men Aged 65 and Older Who Receive Watchful Waiting as Initial Therapy for Prostate Cancer, SEER-Medicare 1994–1996

Variable	Model 1 First Primary Care Visit	Model 2 First Urology Visit	Model 3 First PSA Test	Model 4 First Bone Scan	Model 5 First PSA Test or Bone Scan
Race/ethnic group					
White	1.00	1.00	1.00	1.00	1.0
African American	0.83 (0.76–0.92)	0.82 (0.74–0.90)	0.72 (0.65–0.80)	1.42 (1.25–1.62)	0.85 (0.77–0.94)
Hispanic	0.82 (0.72–0.94)	0.96 (0.83–1.10)	0.76 (0.66–0.88)	1.21 (1.00–1.48)	0.85 (0.74–0.98)
SEER historic stage					
In situ	0.97 (0.62–1.52)	1.22 (0.77–1.93)	0.77 (0.47–1.26)	0.50 (0.19–1.34)	0.77 (0.48–1.26)
Local + regional	1.00	1.00	1.00	1.00	1.00
Distant	1.09 (0.88–1.36)	0.70 (0.54–0.91)	0.88 (0.68–1.14)	1.50 (1.09–2.05)	1.00 (0.78–1.28)
Unstaged	0.97 (0.90–1.05)	0.93 (0.86–1.01)	0.97 (0.89–1.06)	1.14 (1.01–1.28)	1.02 (0.94–1.10)
Grade					
Well-differentiated	1.00	1.00	1.00	1.00	1.00
Moderately differentiated	0.93 (0.87–0.99)	1.01 (0.94–1.08)	1.09 (1.02–1.17)	1.48 (1.33–1.64)	1.16 (1.08–1.24)
Poorly/undifferentiated	0.86 (0.78–0.96)	0.95 (0.85–1.06)	0.95 (0.85–1.07)	1.89 (1.62–2.21)	1.05 (0.94–1.17)
Unknown	1.00 (0.91–1.10)	0.86 (0.77–0.95)	1.01 (0.91–1.12)	1.08 (0.92–1.27)	0.99 (0.89–1.09)
Age (yr)	1.02 (1.01–1.02)	0.995 (0.990–1.00)	0.98 (0.98–0.99)	0.997 (0.99–1.00)	0.99 (0.98–0.99)
Comorbidity					
Comorbidity indices					
Inpatient comorbidity score	1.38 (1.17–1.63)	0.91 (0.76–1.10)	0.87 (0.71–1.06)	1.23 (0.95–1.59)	0.95 (0.79–1.15)
Outpatient comorbidity score	1.63 (1.39–1.96)	1.10 (0.91–1.34)	1.07 (0.88–1.31)	1.17 (0.87–1.58)	1.11 (0.91–1.34)
Selected comorbid conditions					
Acute myocardial infarction	1.12 (0.87–1.45)	0.98 (0.75–1.29)	0.78 (0.57–1.05)	1.14 (0.78–1.67)	0.86 (0.64–1.14)
Congestive heart failure	1.24 (1.10–1.39)	1.01 (0.89–1.15)	0.84 (0.73–0.96)	0.99 (0.81–1.20)	0.86 (0.75–0.98)
Chronic obstructive pulmonary disease	1.24 (1.13–1.36)	1.08 (0.98–1.19)	1.06 (0.95–1.18)	1.13 (0.97–1.31)	1.11 (1.00–1.23)
Dementia	1.26 (0.99–1.60)	0.50 (0.37–0.70)	0.57 (0.41–0.78)	0.70 (0.44–1.11)	0.59 (0.44–0.80)
Diabetes with complications	1.03 (0.75–1.43)	1.22 (0.88–1.69)	0.97 (0.67–1.41)	0.94 (0.57–1.55)	0.96 (0.67–1.37)
Education (percent of persons in census tract who did not complete high school)					
20% or less	1.00	1.00	1.00	1.00	1.00
20.01–29.99%	1.15 (1.07–1.24)	1.13 (1.04–1.22)	1.06 (0.98–1.15)	1.17 (1.04–1.32)	1.10 (1.01–1.13)
30.00% or more	1.13 (1.04–1.23)	1.07 (0.98–1.16)	1.08 (0.99–1.18)	1.30 (1.14–1.48)	1.08 (1.041–1.23)
Income (Median annual income of census tract)					
<\$30,000	1.06 (0.98–1.14)	0.89 (0.82–0.97)	0.92 (0.84–1.00)	0.81 (0.72–0.92)	0.89 (0.82–0.97)
\$30,000–39,999	1.12 (1.04–1.21)	0.95 (0.88–1.03)	0.89 (0.82–0.96)	0.93 (0.82–1.05)	0.88 (0.81–0.96)
≥\$40,000	1.00	1.00	1.00	1.00	1.00
Marital status					
Single	0.93 (0.84–1.02)	0.85 (0.76–0.94)	0.89 (0.80–0.99)	0.95 (0.81–1.11)	0.87 (0.78–0.96)
Married	1.00	1.00	1.00	1.00	1.00
Divorced	0.77 (0.67–0.89)	0.63 (0.53–0.74)	0.57 (0.48–0.67)	0.82 (0.66–1.03)	0.62 (0.53–0.73)
Separated	0.67 (0.41–1.12)	0.74 (0.44–1.25)	0.67 (0.38–1.19)	0.90 (0.45–1.81)	
Widowed	0.94 (0.86–1.03)	0.92 (0.84–1.00)	0.85 (0.77–0.93)	0.92 (0.81–1.06)	0.64 (0.37–1.10)
Unknown	0.94 (0.86–1.03)	0.95 (0.86–1.04)	0.96 (0.88–1.05)	0.99 (0.86–1.13)	0.87 (0.79–0.95)
Goodness of model fit					
Likelihood ratio	263.42	171.94	244.43	176.87	186.19
P value	<0.001	<0.001	<0.001	<0.001	<0.001

PSA = prostate-specific antigen.

receiving PSA testing were race/ethnicity, CHF, DEM, income, and marital status (Table 5). The probability of receiving PSA testing was significantly lower for African American and Hispanic men than white men (HR, 0.72; 95% CI, 0.65–0.80 and HR, 0.76; 95% CI, 0.66–0.88, respectively) and for men who were divorced compared with married men (HR, 0.57; 95% CI, 0.48–0.67). The probability of receiving PSA testing was significantly higher for men with moderately differentiated or unknown-grade tumors compared with men with well-differentiated tumors.

In unadjusted logistic regression analyses, African Americans and Hispanics had a lower probability of receiving at least one PSA test compared with whites (odds ratio [OR], 0.42; 95% CI, 0.32–0.54 and OR, 0.62; 95% CI, 0.41–0.94, respectively; Table 6). The probability of receiving at least one PSA test remained significantly lower for African Americans and Hispanics than whites in a multivariate logistic regression model that adjusted for clinical characteristics (ie, stage, grade, inpatient index, outpatient index, and selected comorbid conditions [model 2]). In a third model that adjusted for the clinical characteristics from model 2 and marital status and the ecologic socioeconomic status measures (ie, median household income and percentage of adults in census tracts that did not complete high school [model 3]), African American (OR, 0.57; 95% CI, 0.47–0.69) and Hispanic men (OR, 0.77; 95% CI, 0.57–1.05) had a lower probability of receiving a PSA test than white men, but findings were significant for African Americans only. Other factors significantly associated with a lower probability of receiving at least one PSA test in model 3 after adjusting for other clinical and demographic characteristics in the model were dementia, being single or separated, and lower income. Each 1-year increase in age was associated significantly with a lower probability of receiving a PSA test. The addition of marital status and the ecologic socioeconomic status variables did not substantially alter the magnitude of the odds ratio for the association between race/ethnicity and the receipt of PSA testing.

### Bone Scans

African American men more frequently received bone scans than either Hispanic or white men (Table 3). Overall, 36.2% of African American men compared with 26.7% of white and 23.1% of Hispanic men received one or more bone scans ( $P = 0.0210$ ). In a multivariate Cox regression model, the probability of receiving a bone scan was significantly higher for African American and marginally higher for Hispanic men than white men. Other factors significantly associated with an increased probability of receiving a bone scan included higher stage or grade and residing in a census tract in which 40.01% or more of the population did not complete high school. Men who had incomes less than \$30,000 had a

lower probability of receiving a bone scan compared with men with incomes of \$40,000 or more.

### Receipt of Bone Scan or Prostate-Specific Antigen

To determine whether racial/ethnic differences in the receipt of PSA testing were the result of the more frequent receipt of bone scans among African American and Hispanic men, we performed a multivariate Cox regression analyses of the time to receipt of the first PSA test or bone scan, whichever came first (Table 5). After adjusting for clinical characteristics and other demographic variables, African American and Hispanic men had a significantly lower probability of receiving either a PSA test or bone scan compared with white men.

### DISCUSSION

We found racial/ethnic variation in the amount of medical monitoring received among patients with prostate cancer initially managed with “watchful waiting.” Although African American men had a higher prevalence of comorbidity, they were less frequently seen by a primary care provider, and when seen, had a lower median number of visits than white men. African American and Hispanic men also had a lower probability of receiving a urology visit or PSA test but a higher probability of receiving a bone scan. Racial/ethnic differences in the receipt of primary care visits, urology visits, PSA test, and bone scans were not explained by differences in clinical or sociodemographic characteristics. Furthermore, the more frequent receipt of bone scans among African Americans did not offset the less frequent receipt of PSA testing.

The high sensitivity and specificity of PSA for prostate tissue makes it a good marker for prostate cancer<sup>32</sup> and makes it useful for monitoring disease progression among patients with prostate cancer.<sup>33</sup> In a study of Japanese patients with prostate cancer managed with watchful waiting, the initial PSA level was associated with the subsequent receipt of treatment.<sup>34</sup> Nonetheless, 30% of African American, 20% of Hispanic men, and 10% of non-Hispanic white men in the current study did not receive PSA testing during the 60-month period postdiagnosis. It is possible that these men received DRE for medical monitoring rather than PSA testing. DRE, however, was not captured in SEER-Medicare data. Furthermore, receipt of a DRE would require a primary care or urology visit, which were less frequently received by African American and Hispanic men. Therefore, it is unlikely that differential rates in the receipt of DRE would explain the observed racial/ethnic variation in the receipt of PSA testing. Moreover, the higher pretreatment PSA levels of African American men noted in other studies<sup>35</sup> suggests a higher risk for disease progression, which would be expected to be the result more frequent medical monitoring.

**TABLE 6.** Logistic Regression Analysis of the Receipt of at Least One Prostate-Specific Antigen Examination From Diagnosis to 60 Months Postdiagnosis Among Men Who Receive Watchful Waiting as Initial Therapy for Prostate Cancer, SEER-Medicare 1994–1996

Variable	Model 1 (unadjusted)	Model 2 (adjusted for race and clinical characteristics)	Model 3 (adjusted for race, clinical characteristics, marital status, income, and education)
Race/ethnic group			
White	1.0	1.0	1.0
African American	0.42 (0.32–0.54)	0.51 (0.43–0.62)	0.57 (0.47–0.69)
Hispanic	0.62 (0.41–0.94)	0.77 (0.57–1.04)	0.77 (0.57–1.05)
SEER historic stage			
In situ		0.76 (0.27–2.14)	0.74 (0.26–2.10)
Local + regional		1.0	1.0
Distant		0.57 (0.36–0.90)	0.59 (0.37–0.93)
Unstaged		0.95 (0.79–1.13)	0.92 (0.76–1.10)
Grade			
Well-differentiated		1.0	1.0
Moderately differentiated		1.16 (0.99–1.36)	1.17 (1.00–1.37)
Poorly/undifferentiated		0.88 (0.69–1.11)	0.89 (0.70–1.12)
Unknown		0.91 (0.73–1.13)	0.94 (0.75–1.18)
Age (yr)			
Comorbidity		0.96(0.95–0.97)	0.96 (0.95–0.97)
Comorbidity indices			
Inpatient comorbidity score		0.64 (0.45–0.93)	0.67 (0.46–0.97)
Outpatient comorbidity score		0.89 (0.57–1.40)	0.90 (0.57–1.43)
Selected comorbid conditions			
Acute myocardial infarction		0.82 (0.47–1.42)	0.67 (0.43–1.32)
Congestive heart failure		0.61 (0.48–0.79)	0.63 (0.49–0.81)
Chronic obstructive pulmonary disease		0.92 (0.74–1.14)	0.96 (0.77–1.19)
Dementia		0.36 (0.23–0.58)	0.35 (0.22–0.57)
Diabetes with complications		0.68 (0.35–1.33)	0.70 (0.35–1.39)
Education* (percent of persons in census tract who did not complete high school)			
20% or less			1.0
20.01–40.0%			1.03 (0.85–1.24)
40.01% or more			1.12 (0.92–1.37)
Income (median annual income of census tract)			
<\$30,000			0.87 (0.72–1.06)
\$30,000–\$39,999			0.82 (0.60–0.99)
≥ \$40,000			1.0
Marital status			
Single			0.74 (0.59–0.93)
Married			1.0
Divorced			0.32 (0.24–0.43)
Separated			0.58 (0.20–1.69)
Widowed			0.74 (0.62–0.90)
Unknown			1.14 (0.91–1.43)
Goodness of model fit			
Likelihood ratio	41.81	222.11	297.54
P value	<0.001	<0.001	<0.001

\*All men in this analysis survived 60 months post-diagnosis and remained untreated throughout the 60 month period ( $n = 3572$ ).

Although all men in this study had healthcare coverage through Medicare Part A & B, differences in the receipt of medical monitoring in this study might still be partially explained by differential access to health care. Data from the National Health Policy Forum indicates that African Americans and Hispanics are less likely to have supplemental insurance coverage through Medigap; however, it is not clear whether this is offset by the higher prevalence of supplemental Medicaid coverage also noted.<sup>36</sup> Factors other than health insurance can influence individual perception of healthcare access.<sup>37</sup> Therefore, it is possible that racial/ethnic differences in the perception of healthcare accessibility could have contributed to differential use of services, including primary care and urology visits and, as a consequence, PSA testing. A more likely explanation, however, is that regular medical monitoring was not recommended by the treating physician or was refused by the patient. This alone, however, would not explain why medical monitoring differed by race/ethnic group unless medical monitoring was less frequently recommended for African American and Hispanic men or they were less compliant with recommendations. Conversely, patients and/or their providers could have decided not to engage in active monitoring.

### Limitations

The exclusion criterion disproportionately excluded Hispanics and African Americans with nearly 68% of Hispanic, and 59.2% of African Americans excluded overall compared with 47.1% of whites. African Americans and Hispanics were more frequently excluded than whites because of the lack of continuous Medicare entitlement 1 year before the date of diagnosis, enrollment in both Medicare Part A & B, because they were enrolled in an HMO, or they were younger than age 65 at the time of diagnosis. Nonetheless, these data remain useful for examining racial/ethnic variation in monitoring in fee-for-service settings.

The receipt of watchful waiting was assumed if the individual did not receive surgery, radiation, or hormone treatment within the first 6 months after the month of diagnosis. Misclassification might have occurred if all treatment was not captured in either of the databases that comprise the SEER-Medicare database. With the exception of oral hormone use, the SEER-Medicare database has been demonstrated to be a highly complete and reliable source for cancer treatment data.<sup>38–40</sup> Furthermore, there is no obvious reason why African American and Hispanic men would be less likely to have their treatment captured than white men, and therefore this is not felt to be a major study limitation.

We were unable to distinguish men who chose to not have medical follow up from men who could have been inappropriately managed by providers. Nonetheless, racial/ethnic variation in medical monitoring, irrespective of the cause, is of interest because of its potential relationship to

disparate outcomes. It is also worth noting that this analysis includes care received by men in fee-for-service health systems only. An additional limitation of these data is the inability to determine whether the specific reason for a primary care visit was for routine medical monitoring or for care of another chronic acute condition unrelated to the prostate cancer.

### CONCLUSION

Regular medical monitoring is considered by most medical authorities to be a necessary component management with watchful waiting. The less frequent receipt of medical monitoring among African American and Hispanic men suggests that there are racial/ethnic disparities in the receipt of appropriate prostate cancer management.

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