Race/Ethnicity and the Receipt of Watchful Waiting for the Initial Management of Prostate Cancer

Vickie L. Shavers, PhD, Martin L. Brown, PhD, Arnold L. Potosky, PhD, Carrie N. Klabunde, PhD, W.W. Davis, PhD, Judd W. Moul, MD, Angela Fahey, BS

INTRODUCTION: **Several recent studies have noted that African Americans disproportionately receive "watchful waiting" for the initial management of their prostate cancer. To determine whether racial/ethnic differences in the receipt of watchful waiting are explained by differences in clinical presentation and life expectancy at the time of diagnosis, we examined Surveillance, Epidemiology, and End Results (SEER)-Medicare data for men diagnosed with prostate cancer in 1994 to 1996.**

METHODS: **Race/ethnicity, comorbidity, stage, grade, age, and expected lifespan and their association with the receipt of watchful waiting were examined in multivariate logistic regression analyses. Race-stratified logistic regression analyses were also used to examine racial/ethnic variation in the association of clinical and demographic factors with the receipt of watchful waiting among African-American, Hispanic, and non-Hispanic white men.**

RESULTS: **African-American (odds ratio [OR], 1.4; 95% confidence interval [CI], 1.3 to 1.6) and Hispanic men (OR, 1.3; 95% CI, 1.1 to 1.5) were significantly more likely than non-Hispanic white men to receive watchful waiting in a multivariate model adjusted for age, comorbidity, stage, grade, and life expectancy. Advanced stage and grade, lower life expectancy, older age, and high comorbidity indices were also significantly associated with an increase in the odds of receipt of watchful waiting in multivariate analyses. In general, the association between the receipt of watchful waiting and the clinical characteristics (i.e., stage, grade, and age) were similar for the three racial/ethnic groups. In race-stratified logistic regression analyses, life expectancy was associated with an increase in the odds of receiving watchful waiting but results were statistically significant for whites only. There was also a statistically significant increase in the odds of receiving watchful waiting for African-American and white men with high comorbidity indices but not Hispanic men. The odds of receiving watchful waiting were also higher for African-American and Hispanic men who resided in census tracts where a large percentage of residents had not completed high school than for white men who resided in similar census tracts.**

CONCLUSION: **The disproportionate receipt of watchful waiting among African Americans and Hispanics is not completely explained by racial/ethnic variation in clinical characteristics or life expectancy as measured in this study. These data suggest that there are other factors that contribute to racial/ethnic differences in receipt of watchful waiting that warrant investigation.**

KEY WORDS: **conservative management; ethnicity; health disparities; prostate cancer; race; watchful waiting.**
J GEN INTERN MED 2004;19:146–155.

Received from the Applied Research Program National Cancer Institute (VLS, MLB, ALP, CNK, WWD), the Department of Surgery/DoD Center for Prostate Disease Research/Uniformed Services University and Walter Reed Army Medical Center (JWM), and Information Management Systems (AF), Bethesda, Md.

The opinions and assertions are the views of the authors and are not to be construed as reflective of the views of the National Cancer Institute or the U.S. Army Department of Defense.

Address correspondence and requests for reprints to Dr. Shavers: National Cancer Institute, Division of Cancer Control and Population Sciences, Applied Research Program/HSEB, 6130 Executive Blvd. EPN 4005 MSC 7344, Bethesda, MD 20892–7344 (e-mail: shaversv@mail.nih.gov).

African-American men account for approximately 13% of the nearly 200,000 new prostate cancer cases diagnosed and 19% of the prostate cancer deaths that occur annually among American men.[1,2] The disparate mortality observed among African Americans is owing in part to the larger proportion of cancers diagnosed at advanced stages of disease compared with whites.[3,4] Several recent studies, however, have noted that African Americans disproportionately receive conservative management (hormonal therapy alone or watchful waiting) for the initial management of their prostate cancer compared with whites.[5,6] African Americans also have been reported to more frequently go untreated,[7–10] and to be less likely to receive a definitive treatment,[11] including radical prostatectomy,[6–9,12,13] for their prostate cancer. Although, a recent review[14] also noted racial/ethnic differences in treatment for prostate cancer, particularly in the receipt of aggressive therapy, little was known about racial/ethnic differences in factors that influence the receipt of specific prostate cancer treatments, including watchful waiting.

Watchful waiting is considered an appropriate management option for men diagnosed with early stage prostate cancer and those who are not expected to live long enough for their prostate cancer to progress to clinically significant disease.[15,16] In general, watchful waiting consists of medical monitoring with digital rectal exam or prostate-specific antigen testing (PSA) until the patient becomes symptomatic or has biochemical or clinical disease progression, at which time the patient is offered definitive treatment with surgery, radiation, hormonal therapy or some combination thereof. Evidence provided in the National Cancer Institute's Physicians Data Query treatment summaries[15] suggest that disease stage, histological grade, patient age, comorbid conditions, PSA levels, and specific sites of metastasis be considered in deciding appropriate treatment options for patients diagnosed with prostate cancer. The National Comprehensive Cancer Network (NCCN) issued treatment guidelines, adopted by several of the major cancer centers, are based on the intent to minimize morbidity and extend

life expectancy.[16] According to NCCN guidelines, treatment should be dependent on patient risk of recurrence determined by the tumor stage; Gleason score and pretreatment PSA, life expectancy (< 5 years), and the presence of symptoms. Watchful waiting is recommended as initial therapy for asymptomatic men with a life expectancy of less than 5 years). Other literature suggest a somewhat different criteria: a life expectancy of 10 years or more is frequently used to determine the appropriateness of potentially curative treatment for localized prostate cancer as a treatment option.[17]

The increased use of PSA testing to screen for prostate cancer[18] has increased the number of men who are diagnosed with preclinical and possibly indolent disease.[19] In one report, 16% of men who received prostatectomy after PSA screening were found to have cancers that were considered clinically insignificant.[20] A recent analysis of the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) registries for 1988 through 1998 showed that 44% of African Americans and 29% of whites whose cancers were detected by PSA screening did not live long enough to have their cancers clinically detected.[21] Currently, owing in part to the limited knowledge of the natural history of prostate cancer, there is no method for reliably determining which tumors will progress to clinically significant disease. Factors most likely to be associated with disease progression include clinical stage, PSA level, including velocity and amplitude,[22] and grade. The accurate prediction of life expectancy is also of clinical importance. Nonetheless, the inability to reliably predict tumors likely to progress to clinically significant disease, coupled with the reduction in quality of life from side effects that often result from definitive prostate cancer treatment,[23,24] contribute to the controversy regarding appropriate prostate cancer management,[7,25–27] differences in beliefs about the relative benefit of PSA screening,[28–31] and screening recommendations.[32] Further adding to the controversy is the fact that improvement in overall survival resulting from definitive treatment has not been conclusively established in randomized controlled trials.[26]

At present, it is unclear whether the disproportionate receipt of watchful waiting noted among African-American men is owing to differences in clinical presentation and life expectancy at the time of diagnosis, inappropriate management, patient refusal of active treatment, or other factors. Further, we know little about the receipt of watchful waiting or factors that are associated with the receipt of watchful waiting among Hispanic men. We examined data on men aged 65 years and older who were diagnosed with prostate cancer in 1994 to 1996 to determine whether differences in clinical characteristics such as the presence or type of comorbidity, stage, grade, and age/expected lifespan might explain racial/ethnic differences in the receipt of watchful waiting.

METHODS

SEER-Medicare data were used for the analyses in this study. The SEER data were linked with Medicare data in the manner described in detail elsewhere.[33] Individuals included in this study were African-American, Hispanic, or white men diagnosed with prostate cancer during 1994 to 1996 and reported to one of the SEER registries.

Inclusion/Exclusion Criteria

Eligible men were aged 65 years or older, had continuous Medicare Part A & B coverage for at least 1 year prior to diagnosis, 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. Patients with discrepancies of 3 months or more between the SEER and Medicare dates of death or who did not live 6 months or more after diagnosis were excluded.

Socioeconomic Status

Socioeconomic data were obtained from the 1990 Census of the US 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 by using the census tract of the patient's residence at the time of diagnosis.

Stage

We use SEER historic stage to examine racial/ethnic variation in stage at diagnosis. SEER-modified American Joint Committee on Cancer (AJCC) stage was not used because of changes in the way cancers at this site are coded, resulting in a large proportion of unstaged/unknown stage cancers (44% to 51%) using this system. Data used to stage prostate cancer can come from clinical or pathological exams. 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. 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. For men diagnosed from 1995 to 1996, local and regional disease stages are combined into one category.

Grade

Grade was coded as well, moderately, or poorly differentiated.[34]

Life Expectancy

Life expectancies were obtained from race/ethnic-specific life tables for the US population for 1998.[35] In

general, among persons of the same age, racial/ethnic minorities have lower life expectancies than whites owing to a higher prevalence of factors that adversely impact survival, including comorbidity.

Comorbidity

Both the evidence from the National Cancer Institute's Physician Data Query treatment summaries[15] and the National Comprehensive Cancer Network guidelines[16] suggest that comorbidity should be a consideration in deciding appropriate treatment options for men diagnosed with prostate cancer. Given the importance of comorbidity to treatment recommendations for prostate cancer, a comprehensive comorbidity measure that captured both inpatient and outpatient conditions as well as specific comorbid conditions that would be the most likely to influence treatment recommendations was constructed. We first developed indicator variables for 5 conditions identified by a panel of 5 clinical experts in an informal survey as those that were more likely to influence prostate cancer treatment recommendations. These include myocardial infarction within the 6-month period prior to cancer diagnosis (AMI) and a history of congestive heart failure (CHF), diabetes with complications (DM), chronic obstructive pulmonary disease (COPD), or dementia (DEM). We then developed two comorbidity indices based on an algorithm developed by the National Cancer Institute for use with SEER-Medicare data.[36] The indices were computed as two weighted summary comorbidity scores, one for inpatient conditions and one for outpatient conditions, based on inpatient claims and physician claims, respectively, for the 12-month period prior to diagnosis. The two indices initially excluded the 5 conditions represented by the indicator variables. The 7 comorbidity measures (i.e., inpatient and outpatient indices and the indicator variables for the 5 selected conditions) were then examined in a multivariate logistic regression model that only contained the 7 comorbidity measures to determine which were significantly associated with the receipt of watchful waiting. In the multivariate model, the two summary indices and the indicator variables for CHF, COPD, and DEM were significantly associated with the receipt of watchful waiting but not AMI and DM. Because AMI and DM were not independently associated with the receipt of watchful waiting, they were added back to the conditions used to calculate the inpatient and outpatient indices. These two indices and the three indicator variables were used for all analyses that examined comorbidity with the exception of the race-stratified logistic regression models. For these models, only the inpatient and outpatient comorbidity indices were used to examine the association between comorbidity and the receipt of watchful waiting. This alternative approach was employed to offset the reduction in statistical power that would result from the use of multiple comorbidity measures and the smaller sample sizes available for the race-stratified analyses.

Treatment

Men were determined to have received watchful waiting as initial treatment for their prostate cancer if they did not receive surgery, radiation, or hormone treatment within the first 6 months after the month of diagnosis.

Statistical Methods

The χ^2-test for homogeneity of proportions was used to evaluate the significance of differences in the distribution of categorical variables. The Student *t* test and the Analysis of Variance (ANOVA) were used to evaluate the significance of racial/ethnic differences in the mean and medians of continuous variables. Multivariate logistic regression analyses were used to examine the association between clinical and sociodemographic characteristics and the receipt of watchful waiting vs aggressive treatment (i.e., surgery, radiation, or hormonal therapy) for initial prostate cancer management. Independent variables included race, age, life expectancy, comorbidity, grade, stage, and marital status. We also included the ecologic socioeconomic measures; mean annual income of the census tract and percentage of individuals in the census tract over age 25 who had completed high school. All variables found to have a significant association ($P \leq .10$) with the receipt of watchful waiting in univariate analyses were entered into a multivariate model. Variables with a P value $< .05$ were retained in the multivariate model to produce a main effects model. All data analysis were performed with SAS Version 9 (SAS Institute, Inc., Cary, NC).[37]

RESULTS

During 1994 to 1996, 49,905 men who were diagnosed with prostate cancer included in the SEER-Medicare database. Of these, 6,121 were African American, 3,177 were Hispanic, and 40,607 were non-Hispanic white. Of these, 7,595 were excluded from this analysis because they were aged less than 65 years at the time of diagnosis, 4,256 because they lacked continuous Medicare Part A & B coverage, 10,784 because they were enrolled in an HMO, 277 because they did not have a known month of diagnosis, 1,405 because they did not live 6 months or more after diagnosis, 610 because they were diagnosed at autopsy or by death certificate, and 4 because they were diagnosed with a second prostate cancer. After these exclusions, 24,974 men were eligible for inclusion in this study. Of these, 2,500 (10%) were African-American, 1,010 (4%) were Hispanic, and 21,464 (86%) were non-Hispanic white men.

Demographic Characteristics

The distribution of the mean and median value of demographic characteristics and the ecologic census tract variables varied by race/ethnic group (Table 1). The median household income for the census tracts in which African-American prostate cancer patients resided was $23,071 compared with $27,943 for Hispanics and

Table 1. Demographic Characteristics of Men Diagnosed with Prostate Cancer, Surveillance, Epidemiology, and End Results 1994 to 1996. All Patients Were Entitled to Medicare in the 12 Months Prior to Diagnosis*

	African American *N* = 2,500	White Hispanic *N* = 1,010	White Non-Hispanic *N* = 21,464	*P* Value
Mean age, y	73.6	74.4	74.4	< .0001
Education				
Persons in census tract who did not complete high school, mean %	42.2	36.1	24.9	< .0001
Persons in census tract who did not complete high school, median %	43.7	35.8	24.4	< .0001
Income				
n	2,137	523	17,895	
Annual income of census tract, median $	23,071	27,943	38,372	< .0001
Marital status, %				
Single	15.0	8.7	6.4	
Married	52.9	64.7	71.8	
Divorced	8.3	5.7	3.2	< .0001
Separated	1.4	1.1	0.18	
Widowed	12.9	12.8	10.0	
Unknown	9.5	7.0	8.4	

* *Missing values were removed for the purpose of this analysis and that is why the n counts change.*

$38,372 for whites ($P < .001$). African-American prostate cancer patients also more frequently lived in census tracts in which a large proportion of residents did not complete high school. The median percent of persons who did not complete high school was nearly 44% for the census tracts in which African-American prostate cancer patients lived compared with 35.8% for Hispanics and 24.4% for whites ($P < .001$). African Americans also were more frequently single compared with either Hispanics or whites. Although African Americans also had a slightly lower mean age at diagnosis than Hispanics and whites (73.6, 74.4, and 74.4, respectively), there was no statistically significant difference in either the mean or median age.

Clinical Characteristics

There were also statistically significant racial/ethnic variations in clinical characteristics, including SEER historic stage, grade, and life expectancy (Table 2). African Americans were more frequently diagnosed with distant and unstaged or unknown stage disease, less frequently diagnosed with well-differentiated tumors, and less frequently had life expectancies of 10 years or more at the time of diagnoses compared with either Hispanics or non-Hispanic whites.

Comorbidity

Comorbid conditions were more prevalent among African Americans than either Hispanics or whites (Table 2). Just greater than 32% of African Americans, 24.9% of Hispanics, and 22.8% of whites had at least one comorbid condition as measured by either inpatient or outpatient claims data ($P < .001$). Overall, the most frequently reported comorbid conditions were COPD (6.8%); DM (6.8%); malignancy other than prostate cancer (4.9%); CHF (3.5%); and cerebrovascular disease (3.3%). African Americans and Hispanics had a statistically significant higher prevalence of 4 of the 5 comorbid conditions believed to be the most likely to influence prostate cancer treatment recommendations than whites. These included CHF, COPD, DEM, and DM. The mean inpatient and outpatient comorbidity indices were significantly higher for African Americans and Hispanics than whites (data not presented).

Receipt of Watchful Waiting as Initial Therapy

African Americans and Hispanics were significantly more likely than whites to receive watchful waiting for the initial management of their prostate cancer. Overall, 23.8% of men eligible for this study received watchful waiting. However, nearly 29% of African Americans and 28.4% of Hispanics received watchful waiting compared with 23% of whites. In univariate logistic regression analyses that separately examined clinical characteristics, race/ethnic group, age, stage, grade, and life expectancy, inpatient comorbidity index, outpatient comorbidity index, CHF, DEM, and COPD were significantly associated with the receipt of watchful waiting (data not presented) and were entered into a multivariate model.

Several factors, including race and ethnicity, were found to be independently associated with the receipt of watchful waiting in multivariate logistic analyses after adjustment for clinical characteristics (Table 3). In a model adjusted for age, comorbidity, stage, grade, and life expectancy (Model 2), African-American (odds ratio [OR], 1.4; 95% confidence interval [CI], 1.3 to 1.6) and Hispanic men (OR, 1.3; 95% CI, 1.1 to 1.5) were significantly more likely than white men to receive watchful waiting. Advanced stage and grade were associated with an increased odds of receiving watchful waiting, while life expectancy < 10 years, increased

Table 2. Clinical Characteristics of Men Diagnosed with Prostate Cancer by Race/Ethnic Group, Surveillance, Epidemiology, and End Results 1994 to 1996

	African American *N* = 2,701	White Hispanic *N* = 1,072	White Non-Hispanic *N* = 22,575	*P* Value
Seer historic stage				
In situ	0.16	0.10	0.11	
Localized (1994)	23.7	26.7	23.0	
Regional (1994)	4.2	6.1	6.3	< .0001
Distant	7.9	6.6	5.5	
Local + regional (1995 to 1996)	50.1	51.1	54.0	
Unstaged/unknown stage	13.9	9.3	11.1	
Grade				
Well differentiated	9.4	14.7	13.6	
Moderately differentiated	55.0	52.2	57.5	
Poorly/undifferentiated	23.0	24.9	20.7	< .0001
Unknown grade	12.6	8.3	8.3	
Life expectancy at time of diagnosis, y				
< 5	2.6	6.5	4.0	
5 ≤ 10	40.6	29.3	33.5	< .0001
10+	56.8	64.2	62.5	
Comorbidity				
Prevalence of selected comorbid conditions				
Acute myocardial infarction	1.0	0.5	0.9	.329
Congestive heart failure	5.0	4.7	3.2	< .001
Chronic obstructive pulmonary disease	8.1	6.1	6.7	.018
Dementia	1.0	0.7	0.5	.005
Diabetes with complications	1.3	0.7	0.4	< .001
Inpatient claims*				
Acute myocardial infarction	0.8	0.4	0.9	.0003
Congestive heart failure	2.7	3.0	2.0	.0004
Chronic obstructive pulmonary disease	4.1	2.9	3.2	.0008
Dementia	0.8	0.3	0.4	.0001
Diabetes with complications	0.6	0.5	0.2	< .0001
Outpatient claims*				
Acute myocardial infarction	0.2	0.1	0.2	< .0001
Congestive heart failure	3.6	3.0	2.0	< .0001
Chronic obstructive pulmonary disease	5.7	4.6	4.8	< .0001
Dementia	0.3	0.4	0.2	< .0001
Diabetes with complications	0.8	0.2	0.2	< .0001

* *Prevalence of comorbid conditions was for selected conditions only, thus they do not add to 100.*
Table generated on 7/15/02.

age, and comorbidity were associated with lower odds of receiving watchful waiting.

In a third multivariate model additionally adjusted for demographic characteristics (marital status, income, and education), the odds of receiving watchful waiting for African-American (OR, 1.3; 95% CI, 1.1 to 1.4) and Hispanic men (OR, 1.2; 95% CI, 1.03 to 1.4) were slightly reduced but remained significantly higher than those of white men. There were little or no changes in the ORs for stage, grade, life expectancy, age, and comorbidity. Men who were single or separated, with incomes less than $40,000, or who lived in census tracts where 30% or more of the population did not complete high school were significantly more likely to receive watchful waiting than were men without these characteristics.

Because of the independent association of race/ethnicity with the receipt of watchful waiting after controlling for relevant clinical and sociodemographic variables, we examined racial/ethnic differences in factors that influenced receipt of watchful waiting in race/ethnic group-stratified multivariate logistic regression analyses in a manner analogous to the analyses for the overall sample (Table 4).

In general, there were few racial/ethnic differences in clinical factors associated with the receipt of watchful waiting. Among African Americans and whites, watchful waiting was significantly more frequently received among men with in situ, local, or unstaged/unknown disease and men with high inpatient or outpatient comorbidity indices. Although Hispanic men with unstaged/unknown disease or with a high inpatient comorbidity index were also somewhat more likely to receive watchful waiting, this was not a statistically significant finding. A high outpatient comorbidity index was not significantly associated with the receipt of watchful waiting among Hispanic men. The receipt of watchful waiting increased by approximately 8%

Table 3. Multivariate Logistic Regression Analysis of the Receipt of "Watchful Waiting" as Initial Therapy for Prostate Cancer Among Men Aged 65 and Older, Surveillance, Epidemiology, and End Results-Medicare 1994 to 1996

Variable	Model 1 Unadjusted OR (95% CI)	Model 2 Adjusted for Clinical Characteristics OR (95% CI)	Model 3 Adjusted for Clinical and Demographic Characteristics OR (95% CI)
Race/ethnic group			
White	1.0	1.0	1.0
African American	1.3 (1.2 to 1.4)	1.4 (1.2 to 1.6)	1.3 (1.1 to 1.4)
Hispanic	1.2 (1.1 to 1.4)	1.3 (1.1 to 1.5)	1.2 (1.03 to 1.4)
Seer historical stage			
In situ		9.0 (3.7 to 22.2)	8.8 (3.5 to 21.7)
Local (1994)		1.0	1.0
Regional (1994)		0.3 (0.3 to 0.4)	0.4 (0.3 to 0.4)
Distant		0.2 (0.1 to 0.2)	0.2 (0.1 to 0.2)
Local + regional (1995 to 1996)		0.9 (0.8 to 1.0)	0.9 (0.8 to 0.98)
Unstaged/unknown		1.2 (1.1 to 1.4)	1.2 (1.1 to 1.3)
Grade			
Well differentiated		1.0	1.0
Moderately differentiated		0.3 (0.2 to 0.3)	0.3 (0.2 to 0.3)
Poorly/undifferentiated		0.1 (0.09 to 0.13)	0.1 (0.1 to 0.12)
Unknown		0.5 (0.4 to 0.5)	0.4 (0.4 to 0.5)
Life expectancy, y			
< 10		1.4 (1.3 to 1.6)	1.4 (1.3 to 1.6)
10+		1.0	1.0
Age at diagnosis		1.1 (1.07 to 1.09)	1.1 (1.07 to 1.09)
Comorbidity			
Congestive heart failure		1.4 (1.2 to 1.6)	1.4 (1.2 to 1.6)
Chronic obstructive pulmonary disease		1.4 (1.2 to 1.5)	1.4 (1.2 to 1.5)
Dementia		2.1 (1.4 to 3.0)	2.0 (1.4 to 3.0)
Mean inpatient comorbidity index		1.9 (1.5 to 2.4)	1.9 (1.5 to 2.4)
Mean outpatient comorbidity index		1.3 (1.0 to 1.6)	1.3 (1.0 to 1.6)
Marital status			
Single			1.5 (1.4 to 1.7)
Married			1.0
Divorced			1.2 (0.7 to 2.1)
Separated			1.6 (1.4 to 1.9)
Widowed			1.1 (1.0 to 1.3)
Unknown			1.6 (1.4 to 1.8)
Income, $			
< 30,000			1.1 (1.03 to 1.2)
30,000–39,999			1.1 (1.03 to 1.2)
≥ 40,000			1.0
Education, %			
< 20			1.0
20 to 29.99			1.1 (1.1 to 1.2)
≥ 30			1.2 (1.1 to 1.3)

OR, odds ratio; CI, confidence interval.

for each year increase in age for African Americans, by 9% for whites, and by 4% for Hispanics. Higher grade was associated with a decrease in the odds of receiving watchful waiting for all three racial/ethnic groups. The odds of receiving watchful waiting among same race/ethnic group men with incomes < $30,000 compared with men with incomes of $40,000 or more was 1.7 (95% CI, 0.9 to 3.1) for Hispanics, 1.4 (95% CI, 0.95 to 2.0) for African Americans, and 1.1 (95% CI, 1.0 to 1.2) for whites. Similarly, among same race/ethnic group men who lived in census tracts where 30% or more of the population had not completed high school compared with those who lived in census tracts where < 20% of the population had not completed high school, the odds of the receipt of watchful waiting were 2.1 (95% CI, 1.5 to 3.0) for Hispanics and 1.3 (95% CI, 1.0 to 1.7) for African Americans compared with 1.1 (95% CI, 1.1 to 1.3) for whites.

DISCUSSION

Several factors were associated with the receipt of watchful waiting among men in this study. These include race/ethnic group, stage, grade, life expectancy, age, comorbidity, marital status, income, and education. Racial

Table 4. Race-Stratified Multivariate Logistic Regression of the Receipt Among Watchful Waiting, Surveillance, Epidemiology, and End Results-Medicare 1994 to 1996

Variable	African Americans Model 1, OR (95% CI)	Hispanics Model 2, OR (95% CI)	Whites Model 3, OR (95% CI)
Seer historical stage			
In situ	9.8 (1.0 to 96.5)	n/a	10.1 (3.7 to 27.3)
Local/regional (1994 to 1996)	1.0	1.0	1.0
Distant	0.2 (0.1 to 0.4)	0.2 (0.1 to 0.6)	0.2 (0.1 to 0.2)
Unstaged/unknown	1.4 (1.0 to 1.8)	1.0 (0.5 to 1.7)	1.3 (1.2 to 1.5)
Grade			
Well differentiated	1.0	1.0	1.0
Moderately differentiated	0.4 (0.3 to 0.5)	0.2 (0.1 to 0.3)	0.3 (0.2 to 0.3)
Poorly/Undifferentiated	0.2 (0.2 to 0.3)	0.1 (0.05 to 0.15)	0.1 (0.08 to 0.11)
Unknown	0.6 (0.4 to 0.8)	0.5 (0.3 to 0.9)	0.4 (0.4 to 0.5)
Life expectancy, y			
< 10	1.3 (0.9 to 1.7)	1.4 (0.8 to 2.4)	1.4 (1.3 to 1.6)
10+	1.0	1.0	1.0
Age at diagnosis	1.1 (1.06 to 1.11)	1.0 (1.0 to 1.1)	1.09 (1.08 to 1.1)
Comorbidity			
Inpatient comorbidity index	1.9 (1.1 to 3.3)	1.4 (0.5 to 4.4)	2.8 (2.2 to 3.7)
Outpatient comorbidity index	1.9 (1.1 to 3.3)	0.8 (0.3 to 2.3)	1.4 (1.0 to 1.8)
Marital status			
Single	1.4 (1.1 to 1.9)	1.1 (0.6 to 1.9)	1.6 (1.4 to 1.8)
Married	1.0	1.0	1.0
Divorced	1.9 (1.4 to 2.7)	0.7 (0.3 to 1.5)	1.6 (1.4 to 2.0)
Separated	0.7 (0.3 to 1.8)	2.3 (0.6 to 9.1)	1.5 (0.7 to 3.6)
Widowed	1.5 (1.1 to 1.9)	0.9 (0.5 to 1.4)	1.1 (1.0 to 1.3)
Unknown	0.9 (0.7 to 1.3)	2.2 (1.3 to 4.0)	1.7 (1.5 to 1.9)
Income, $			
< 30,000	1.4 (1.0 to 2.0)	1.7 (0.9 to 3.1)	1.1 (1.0 to 1.2)
30,000–39,999	1.2 (0.9 to 2.1)	0.7 (0.3 to 1.6)	1.1 (1.0 to 1.3)
≥ 40,000	1.0	1.0	1.0
Education, %			
< 20	1.0	1.0	1.0
20 to 29.99	1.6 (1.1 to 2.3)	2.6 (1.5 to 4.4)	1.1 (1.0 to 1.2)
≥ 30	1.3 (1.0 to 1.7)	2.1 (1.5 to 3.0)	1.2 (1.1 to 1.3)

OR, odds ratio; CI, confidence interval.

differences in the receipt of watchful waiting were not completely explained by differences in clinical characteristics, comorbidity, or life expectancy at the time of diagnosis. After controlling for stage, grade, life expectancy, age, comorbidity, marital status, income, and education in a multivariate model, race/ethnicity were independently associated with the receipt of watchful waiting.

There was little difference between racial/ethnic groups in the odds associated with various clinical characteristics and the receipt of watchful waiting in race-stratified models. In contrast, the magnitude of the odds for the socioeconomic characteristics varied and was particularly large for the association with education among Hispanics. These data suggest that socioeconomic characteristics might have a greater influence on receipt of watchful waiting among racial/ethnic minority men than white men, especially for Hispanic men.

Life expectancy (< 10 years) was a statistically significant predictor of the receipt of watchful waiting for whites but not African Americans or Hispanics. In general, racial/ethnic minorities have lower life expectancies at birth than whites owing to higher mortality rates from several causes, including chronic conditions such as diabetes and heart disease. It is not clear whether or how physicians estimate life expectancy, particularly for racial/ethnic minority men, which may partially account for the differential effect we observed. A recent study showed that physicians correctly estimated whether life expectancy was greater or less than 10 years 82% of the time in fictional patients when given information about age and comorbidity.[17] This study, however, did not examine the role of race/ethnicity; therefore, the ability of physicians to accurately predict life expectancy for racial/ethnic minority men and its role in prostate cancer treatment decision-making among minority men is unclear. We did note that the odds of receiving watchful waiting increased approximately 8% for every 1-year increase in age for African Americans and whites but only 4% for Hispanics. The odds of receiving watchful waiting were also higher for men with comorbidities and among men with CHF, COPD, and dementia.

The independent association of race/ethnicity with the receipt of watchful waiting suggests that factors other than the clinical and sociodemographic characteristics we examined contribute to racial/ethnic variation in the receipt

of watchful waiting. These possibly include the pretreatment PSA level, patient desire to avoid treatment side effects or to have the cancer removed, and physician preference or bias in recommendations or other factors not measured in the present study. In a prospective controlled trial, which focused on patient preference for treatment of early prostate cancer in the United Kingdom, only 2% of men elected watchful waiting. It is also noted that men who elected watchful waiting had lower pretreatment PSA levels and Gleason scores.[38] The higher pretreatment PSA levels found among African-American men across stage, grade, and age categories,[39] however, would suggest a higher rate of active treatment would be more likely among African-American than white men. The reverse was observed in the present study of treatment received by men diagnosed in 1994 to 1996. Twenty-three percent of whites and nearly 30% of African Americans and Hispanics in the present study received watchful waiting. In another recent study in the UK, men who elected to be managed with watchful waiting indicated that they wanted to avoid incontinence and impotence and were aware that treatment might not necessarily prolong life.[40] A study of decision-making among US men with localized prostate cancer showed that 51% of respondents indicated that the most important factor influencing their treatment decision was the physician's recommendation followed by advice from friends and family (19%), information from books and journals (18%), and the internet (7%).[41] Differences in recommendations, advice, or exposure to treatment information therefore might also contribute to the racial/ethnic differences in the receipt of watchful waiting. This is supported in part by data from a recent study which showed that hormonal treatment was significantly less often discussed as a treatment option for African-American compared with white prostate cancer patients.[42] Among men with distant stage disease, for whom hormonal therapy is more frequently recommended, African-American men (45.5%) less frequently received hormonal therapy including orchiectomy than white men (59.1%), but differences did not reach statistical significance. Fifty-seven percent of patients in this study cited the physician's suggestion as the most influential factor in the treatment decision. Few other studies have examined racial/ethnic variation in factors that influence prostate cancer treatment decision-making.

In the absence of evidence of benefit from definitive treatment, it is not clear whether the disproportionate receipt of watchful waiting we observed for African Americans and Hispanics or represents more or less appropriate care. Clearly, some men who receive watchful waiting might be better served by receiving definitive treatment earlier in their disease process while other men may suffer unnecessarily from the side effects of definitive treatment without the potential for real benefit. In a recent study in Sweden, men who received prostatectomy had a statistically significant lower rate of progression and relative hazard of death from prostate cancer than men who received watchful waiting; however, there were no statistically significant differences in overall survival.[43] The increasing use of PSA testing as a screening tool and the consequent increase in the number of men diagnosed with early stage cancers highlight the importance of being able to accurately predict who is more likely to benefit from definitive treatment. Several molecular tests are being developed that show promise as more accurate predictors of men at increased risk of progression.[44]

Our study differs from other published reports in several ways. First, we present data on selected clinical and sociodemographic factors and their association with the receipt of watchful waiting among African-American, Hispanic, and white prostate cancer patients. We also examine the role of comorbidity and its relationship to the receipt of watchful waiting. Further, previous studies that have examined patterns of care for prostate cancer among Hispanic men have focused on the use of complementary and alternative medicine,[45] or radiation therapy,[46,47] rather than the receipt of watchful waiting.

Limitations

Life expectancy was determined from life tables, which may not account for individual differences in the prevalence of factors that influence mortality, such as current health status or behavioral risks. We attempt to control for current health status by including comorbidity as a covariate in multivariate models. Nonetheless, life expectancy as measured in this study may not reflect the actual criteria used to assess life expectancy in the clinical setting.

The receipt of watchful waiting was assumed if the individual did not receive definitive treatment such as surgery, radiation, or hormone treatment within the first 6 months of diagnosis. Therefore, some men classified as receiving watchful waiting might have elected not to have follow up or may have been misclassified if their treatment was not captured in the databases used in this study. However, it is worth noting that these data were compiled from two databases, the SEER registries and the Medicare claims data, which should have reduced the amount of misclassification. These databases have been demonstrated to be a highly complete and reliable source for cancer treatment data in general;[48–50] however, it is possible that oral hormone treatment is not as well captured. Further, it is not clear why African-American and Hispanic men would be more likely to be misclassified than white men. Thus, while misclassification could have some impact on the results of this study, it is not felt to be a major limitation.

Men included in this study were aged 65 years and older and thus findings cannot be generalized to younger men. Further, it is possible that racial/ethnic variation in the appropriate receipt of watchful waiting might be more prevalent among younger men with longer life expectancies. Data from the *Prostate Cancer Outcomes Study* for men diagnosed 1994 to 1995, however, show that the receipt of definitive treatment among men under age 60 was similar for African Americans, Hispanics, and whites.[5]

We were also unable to examine treatment received by patients who were enrolled in HMOs.

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, or because they were enrolled in an HMO or were younger than 65 years at the time of diagnosis. Thus, it is possible that these results may not accurately estimate the true magnitude of the odds of receiving watchful waiting for racial/ethnic minority men.

CONCLUSION

Race/ethnicity were independently associated with the receipt of watchful waiting among the men in this study after adjustment for clinical characteristics and life expectancy. Additional studies are needed to determine if these differences are owing to racial/ethnic differentials in patient treatment preferences, provider recommendations and/or preferences, or other factors that influence prostate cancer treatment decision-making and to determine if treatment differences contribute to racial/ethnic disparities in prostate cancer mortality.

REFERENCES

1. American Cancer Society. Cancer Facts and Figures 2001. Atlanta, Ga: American Cancer Society; 2001.
2. American Cancer Society. Cancer Facts and Figures for African Americans. Atlanta, Ga: American Cancer Society; 2001.
3. Ries LAG, Eisner MP, Kosary CL, et al., eds. SEER Cancer Statistics Review 1973–99, National Cancer Institute. Bethesda, Md: http://seer.cancer.gov/csr/1973–1999/2002.
4. Hoffman RM, Gilliland J, Eley W, et al. Racial and ethnic differences in advanced stage prostate cancer: the Prostate Cancer Outcomes Study. J Natl Cancer Inst. 2001;93:388–95.
5. Harlan LC, Potosky A, Gilliland FD, et al. Factors associated with initial therapy for clinically localized prostate cancer: Prostate Cancer Outcomes Study. J Natl Cancer Inst.; 2001;93:1864–71.
6. Klabunde C, Potosky AL, Harlan LC, Kramer BS. Trends and black/white differences in treatment for nonmetastatic prostate cancer. Med Care. 1998;36:1337–48.
7. Desch CE, Penberthy L, Newschaffer CJ, et al. Factors that determine the treatment of local and regional prostate cancer. Med Care. 1996;34:152–62.
8. Jones GW, Mettlin C, Murphy GP, et al. Patterns of care for carcinoma of the prostate gland. Results of a national survey of 1984 and 1990. J Am Coll Surg. 1995;180:545–54.
9. Fowler JE, Bigler SA, Bowman G, Kilambi NR. Race and cause-specific survival with prostate cancer: influence of clinical stage, Gleason score, age and treatment. J Urol. 2000;163:137–42.
10. Gilliland FD, Hunt WX, Key CR. Ethnic variation in prostate cancer survival in New Mexico. Cancer Epidemiol Biomarkers Prev. 1996;5:247–51.
11. Robbins AS, Whittemore AS, Thom DH. Differences in socioeconomic status and survival among white and black men with prostate cancer. Am J Epidemiol. 2000;1511:409–16.
12. Morris CR, Snipes KP, Schlag R, Wright WE. Sociodemographic factors associated with prostatectomy utilization and concordance with the physician data query for prostate cancer (United States). Cancer Causes Control. 1999;10:503–11.
13. Mettlin CJ, Murphy GP, Cunningham MP, Menck HR. The National Cancer Data Base Report on race, age, and region variations in prostate cancer treatment. Cancer. 1997;80:1261–6.
14. Shavers VL, Brown ML. Racial and ethnic disparities in the receipt of cancer treatment. J Natl Cancer Inst. 2002;94:334–57.
15. National Cancer Institute. Prostate Cancer (PDQ®) Treatment-Health Professionals. http://cancernet.nci.nih.gov,cgi. Last accessed: December 6, 2002.
16. National Comprehensive Cancer Network. The Complete Library of Practice Guidelines in Oncology. Rockledge, Pa: Rockledge; 2001.
17. Krahn MD, Bremner KE, Asaria J, et al. The ten-year rule revisited: accuracy of clinicians' estimates of life expectancy in patients with localized prostate cancer. Urology. 2002;60:258–63.
18. Perron L, Moore L, Bairati I, Bernard P, Meyer F. PSA screening and prostate cancer mortality. Can Med Assoc J. 2002;166:586–91.
19. Jacobsen SJ, Katusic SK, Bergstralh EJ, et al. Incidence of prostate cancer diagnosis in the eras before and after serum prostate-specific antigen testing. JAMA. 1995;274:1445–9.
20. Epstein JI, Walsh PC, Carmichael M, Brendler CB. Pathologic clinical findings predict tumor extent nonpalpable (stage T1C) prostate cancer. JAMA. 1994;271:368–74.
21. Etzioni R, Penson DF, Legler JM, et al. Overdiagnosis due to prostate specific antigen screening: lessons from U.S. prostate cancer incidence trends. J Natl Cancer Inst. 2002;94:981–90.
22. Vollmer RT, Egawa S, Kuwao S, Baba S. The dynamics of prostate specific antigen during watchful waiting of prostate cancer. Cancer. 2002;94:1692–8.
23. Teloken C. Management of erectile dysfunction secondary to treatment for localized prostate cancer. Cancer Control. 2001; 6:540–5.
24. Grise P, Thurman S. Urinary incontinence following treatment of localized prostate cancer. Cancer Control. 2001;6:532–9.
25. Stephenson RA. Prostate cancer trends in the era of prostate-specific antigen. An update of incidence, mortality, and clinical factors from the SEER database. Urol Clin North Am. 2002;29:173–81.
26. Wilt TJ. Clarifying uncertainty regarding detection and treatment of early-stage prostate cancer. Semin Urol Oncol. 2002;20:10–7.
27. Potosky AL, Legler J, Albertsen PC, et al. Health outcomes after prostatectomy or radiotherapy for prostate cancer: results from the prostate cancer outcomes study. J Natl Cancer Inst. 2000; 92:1582–92.
28. Yao S, Yao G. Understanding and appreciating overdiagnosis in the PSA era. J Natl Cancer Inst. 2002;94:958–9.
29. Tannock IF. Eradication of a disease: how we cured symptomless prostate cancer. Lancet. 2002;359:1341–2.
30. Vis AN. Does PSA screening reduce prostate cancer mortality? Can Med Assoc J. 2002;166:586–7.
31. Neal DE, Donovan JL. Prostate cancer: to screen or not to screen? Lancet Oncol. 2000;1:17–24.
32. Bunting PS. Screening for prostate cancer with prostate-specific antigen: beware the biases. Clin Chimica Acta. 2002;315:71–97.
33. Warren JL, Klabunde CN, Schrag D, Bach PB, Riley GF. Overview of the SEER-Medicare Data. Med Care. 2002;40 (suppl):IV-3–IV-18.
34. Fritz A, Ries L. The SEER Program Code Manual, 3rd edn. Cancer Statistics Branch, Surveillance Program, Division of Cancer Control and Population Sciences National Cancer Institute, January 1, 1998.
35. Anderson RN. Unites States Life Tables 1998 National Vital Statistics Reports. Vol. 48. No 18. Hyattsville. Md: National Center for Health Statistics; 2001.
36. Klabunde CN, Potosky AL, Legler JM, Warren J. Development of a co-morbidity measure using physician claims data. J Clin Epidemiol. 2000;53:1258–67.
37. SAS Institute Inc. SAS Version 9.0. Cary, NC.

38. The North-West Uro-Oncology Group. A Preliminary Report on a Patient-Preference Study to Compare Treatment Options in Early Prostate Cancer. Stockport, UK: BJU International; 2002;90:253–6.
39. Moul JW, Swsterhenn IA, Connelly RR, et al. Prostate-specific antigen values at the time of prostate cancer diagnosis in African American men. JAMA. 1995;274:1277–81.
40. Chapple A, Siebland S, Herxheimer A, McPherson HA, Shepperd S, Miller R. Is 'watchful waiting' a real choice for men with prostate cancer? A qualitative study. BJU Int. 2002;90:257–64.
41. Diefenbach MA, Dorsey J, Uzzo RG, et al. Decision-making strategies for patients with localized prostate cancer. Semin Urol Oncol. 2002;20:55–62.
42. Demark-Wahnefried W, Schildkraut JM, Iselin CE, et al. Treatment options, selection, and satisfaction among African American and white men with prostate carcinoma in North Carolina. Cancer. 1998;83:320–30.
43. Holmberg L, Bill-Axelson A, Helgesen F, et al. A randomized trial comparing radical prostatectomy with watchful waiting in early prostate cancer. N Engl J Med. 2002;347:781–89.
44. McIntyre IG, Clarke RB, Anderson E, Clarke NW, George NJ. Molecular prediction of progression in patients with conservatively managed prostate cancer. Urology. 2001;58:762–6.
45. Lee MM, Chang JS, Jacobs B, Wrensch MR. Complementary and alternative medicine use among men with prostate cancer in 4 ethnic populations. Am J Public Health. 2002;92:1606–9.
46. Zietman A, Moughghan J, Owen J, Hanks G. The patterns of care survey of radiation therapy in localized prostate cancer: similarities between the practice nationally and in minority-rich areas. Int J Radiation Oncol Biol Phys. 2001;50:75–80.
47. Lai S, Lai H, Lamm S, Obek C, Krongrad A, Roos B. Radiation therapy in non-surgically-treated nonmetastatic prostate cancer: geographic and demographic variation. Urology. 2001;57:510–7.
48. Cooper GS, Virnig B, Klabunde CN, Schussler N, Freeman J, Warren JL. Use of SEER-Medicare data for measuring cancer surgery. Med Care. 2002;40:IV43–IV47.
49. Virnig BA, Warren JL, Cooper GS, Klabunde CN, Schussler N, Freeman J. Studying radiation therapy using SEER-Medicare-Linked Data. Med Care. 2002;40(suppl):IV-49–IV-54.
50. Warren J, Harlan LC, Fahey A, et al. Utility of the SEER-Medicare data to identify chemotherapy use. Med Care. 2002;40(suppl): IV-55–IV-61.