

Original article

Income inequality and treatment of African American men with high-risk prostate cancer

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Abstract

Purpose: Definitive treatment of high-risk prostate cancer with radical prostatectomy or radiation improves survival. We assessed whether racial disparities in the receipt of definitive therapy for prostate cancer vary by regional income.

Patients and methods: A cohort of 102,486 men (17,594 African American [AA] and 84,892 non-Hispanic white) with localized high-risk prostate cancer (prostate-specific antigen >20 ng/ml or Gleason \geq 8 or stage \geq cT2c) diagnosed from 2004 to 2010 was identified in the Surveillance, Epidemiology, and End Results database. Income was measured at the census-tract-level. We used multivariable logistic regression to assess patient and cancer characteristics associated with the receipt of definitive therapy for prostate cancer. Multivariable Fine and Gray competing risks analysis was used to evaluate factors associated with prostate cancer death.

Results: Overall, AA men were less likely to receive definitive therapy than white men (adjusted odds ratio [AOR] = 0.51; 95% CI: 0.49–0.54; $P < 0.001$), and there was a significant race/income interaction ($P_{interaction} = 0.016$) such that there was a larger racial treatment disparity in the bottom income quintile (AOR = 0.49; 95% CI: 0.45–0.55; $P < 0.001$) than in the top income quintile (AOR = 0.60; 95% CI: 0.51–0.71; $P < 0.001$). After a median follow-up of 35 months, AA men in the bottom income quintile suffered the greatest prostate cancer mortality (adjusted hazard ratio = 1.47; 95% CI: 1.17–1.84; $P = 0.001$), compared with white men in the top income quintile.

Conclusions: Racial disparities in the receipt of definitive therapy for high-risk prostate cancer are greatest in low-income communities, suggesting that interventions to reduce racial disparities should target low-income populations first. © 2014 Elsevier Inc. All rights reserved.

Keywords: Prostate; Prostatic neoplasms; Health care disparities; Income; African Americans

1. Introduction

Prostate cancer is the most common noncutaneous malignancy diagnosed in men in the United States and the

second greatest cause of cancer-related death. In 2014, an estimated 233,000 American men will receive a new diagnosis of prostate cancer, and 29,480 are expected to succumb to the illness [1].

Among men with localized prostate cancer, those with high-risk disease suffer the greatest risks of disease progression and prostate cancer mortality [2–4] and are the most likely to benefit from definitive therapy [5]. The 2014 National Comprehensive Cancer Network guidelines in Oncology recommend that men with high-risk disease

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receive a radical prostatectomy or radiation therapy as a component of their initial therapy [6].

Compared with white American men, African American (AA) men suffer greater prostate cancer incidence, more advanced disease at diagnosis, and twice the rate of prostate cancer mortality [1,7]. Investigators have tried to identify and quantify the many factors that contribute to these racial gaps in prostate cancer outcomes [8]. Relative to white men, AA men receive less primary therapy [9–13], later treatment [14], and less adjuvant therapy [15]. Although some treatment disparities between white men and men from other races have narrowed with time, AA men have experienced the opposite trend [16]. Furthermore, as the gulf between the highest and lowest paid Americans widens [17,18], income inequality may contribute to the creation of a 2-tiered medical system, with some races disproportionately relegated to poorer care.

It is critical to characterize the communities that continue to struggle in our changing health care system to design targeted interventions. We used the Surveillance, Epidemiology, and End Results (SEER) database to examine whether racial disparities in prostate cancer treatment patterns and prostate cancer mortality vary by income among men with high-risk disease.

2. Methods

2.1. Patient population and study design

This retrospective population-based study included 102,486 AA and non-Hispanic white men with localized high-risk prostate cancer (prostate-specific antigen [PSA] >20 ng/ml or Gleason \geq 8 or stage \geq cT2c) diagnosed between 2004 and 2010 identified in the SEER database. The SEER Program of the National Cancer Institute collects and publishes cancer incidence, treatment, and survival data from 18 population-based cancer registries covering an estimated 28.0% of the US population, including 25.6% of AAs [19]. This study was approved by the institutional review board. A waiver for informed consent was obtained.

SEER identifiers were used to select a cohort that included AA and non-Hispanic white men. As validated in previous SEER studies examining socioeconomic status and patient demographics [20–22], SEER data was linked to the 2000 United States Census [23] to determine, at the county level, median household income and percentage of residents 25 years of age or older with at least a high school education. Data was linked to the 2003 United States Department of Agriculture rural-urban continuum codes [24] to designate counties as urban or rural. As a proxy for patient comorbidity, which is not explicitly coded in the SEER database, we created a variable that identified patients who died of any cause other than prostate cancer within 5 years after their prostate cancer diagnosis. Gleason scores represent the highest value at biopsy or surgery, PSA

values reflect the latest value before the date of prostate cancer diagnosis, and cancer stages follow the American Joint Committee on Cancer sixth edition conventions, as provided in the SEER database. Initial prostate cancer management was divided into definitive therapy or not definitive therapy, where definitive therapy was classified according to National Comprehensive Cancer Network guidelines and included radical prostatectomy, external beam radiation therapy, brachytherapy, or a combination of modalities. Men with any missing data were excluded. Men with any previous cancer or with prostate cancer diagnosed on autopsy or from a death certificate were not included in this analysis.

2.2. Statistical analyses

The primary outcome of this study was the receipt of definitive therapy for localized, high-risk prostate cancer. Baseline clinical and demographic characteristics were compared using the *t* test and chi-square test, as appropriate. Prostate cancer therapy (no definitive therapy or definitive therapy, further divided into surgery [radical prostatectomy], radiation [external beam radiation therapy or brachytherapy], or surgery and radiation) was analyzed stratified by race and income. The chi-square test was used to make pairwise comparisons of receipt of therapy across race and income. The entire cohort (102,486 men) was divided into quintiles on the basis of regional income, and the top and bottom quintiles, representing men living in counties with a median household income of at least \$58,000 or at most \$37,000 (in year 2000 United States dollars), respectively, were compared.

Multivariable logistic regression was used to examine the association between race and receipt of definitive therapy. Covariates included age at prostate cancer diagnosis, income, education, and PSA, which were analyzed as continuous variables, and non-prostate cancer death within 5 years of cancer diagnosis (reference: no), Gleason score (<7, 7, or >7; reference: <7) and residence (urban or rural; reference: urban), which were analyzed as categorical variables. Multivariable logistic regression was then used to explore the relationship between race and income with respect to receipt of definitive therapy, type of therapy, patient assent to therapy, provider recommendation of radical prostatectomy, and receipt of definitive therapy if a provider had not recommended radical prostatectomy. An interaction term was used to determine whether the magnitude of the association of race with outcome differed significantly among patients in the highest vs. lowest regional income quintiles. Adjusted odds ratios (AORs) for the receipt of therapy with corresponding 95% CIs were calculated.

Fine and Gray competing risks analysis [25] was used to assess the association between race and income and risk of prostate cancer mortality. Prostate cancer mortality was coded in SEER, with death from any other cause

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