Prostate Cancer

Racial Disparity in Delivering Definitive Therapy for Intermediate/High-risk Localized Prostate Cancer: The Impact of Facility Features and Socioeconomic Characteristics

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Article info

Abstract

Background: The gap in prostate cancer (PCa) survival between Blacks and Whites has widened over the past decade. Investigators hypothesize that this disparity may be partially attributable to differences in rates of definitive therapy between races.
Objective: To examine facility level variation in the use of definitive therapy among Black and White men for localized PCa.
Design, setting, and participants: Using data from the National Cancer Data Base, we identified 223 873 White and 59 262 Black men ≥40 yr of age receiving care within the USA with biopsy confirmed localized intermediate/high-risk PCa diagnosed between January 2004 and December 2013.
Outcome measurements and statistical analysis: Multilevel logistic regression was fitted to predict the odds of receiving definitive therapy for PCa. Sensitivity and subgroup analyses were performed to adjust for inherent patient and facility-level differences when appropriate.
Results and limitations: Eighty-three percent ($n = 185\ 647$) of White men received definitive therapy compared with 74% ($n = 43\ 662$) of Black men between 2004 and 2013. Overall rates of definitive therapy during that time increased for both White (81% vs 83%, $p < 0.001$) and Black (73% vs 75%, $p = 0.001$) men. However, 39% of treating facilities demonstrated significantly higher rates of definitive therapy in White men, compared with just 1% favoring Black men. Our study is limited by potential selection bias and effect modification.
Conclusions: After adjusting for sociodemographic and clinical factors, we found that most facilities favored definitive therapy in Whites. Health care providers should be aware of these inherit biases when counseling patients on treatment options for localized PCa. Our study is limited by the retrospective nature of the cohort.
Patient summary: We found significant differences in rates of radiation and surgical treatment for prostate cancer among White and Black men, with most facilities favoring Whites. Nonclinical factors such as treatment facility type and location influenced rates of therapy.
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1. Introduction

Prostate cancer (PCa) represents the most frequently diagnosed noncutaneous cancer and the second leading cause of cancer-related mortality among USA men [1]. It is well established that PCa incidence and overall outcomes remain worse for Black men [2]. Additionally, Black men more frequently present with higher-grade and higher-stage disease at the time of diagnosis relative to White men [3]. These disparities are concerning in the setting of recent health care reform efforts such as the Medicare Access and CHIP Reauthorization Act of 2015, which aim to standardize care, regardless of race/ethnicity, through financial incentives [4].

Differences between White and Black men with regards to sociodemographic factors, cultural beliefs, and intrinsic cancer biology have all been proposed as explanations for the aforementioned racial disparities [5–7]. It has also been postulated that Blacks receive different types of definitive therapy and at lower rates relative to Whites [3,8–10]. However, few if any studies have evaluated racial disparities in delivering definitive therapy for clinically localized PCa at the facility level. Consequently, it remains unclear whether the aforementioned racial disparities are the result of *between* hospital geographical versus *within* hospital cultural differences among treating facilities [11,12]. We therefore sought to examine variation in the utilization of definitive therapy (surgery and/or radiotherapy) for the treatment of localized PCa among Black and White men. We focused exclusively on patients with intermediate- and high-risk disease in order to exclude those in whom definitive therapy may not be indicated. Using data from the National Cancer Data Base (NCDB), we hypothesized that White men experience higher rates of definitive therapy relative to Black men, and that the degree of this variation can be explained by nonclinical factors such as facility characteristics and socioeconomic status.

2. Patients and methods

2.1. Data source

The NCDB is a nationwide database that contains information on patterns of cancer care outcomes. NCDB data dates back to 1989 and includes information on more than 29 million cancers from more than 1500 Commission on Cancer (CoC)-accredited programs in the US and Puerto Rico, and captures 70% of newly diagnosed tumors in the USA [13].

2.2. Patient selection

We identified 957 407 White and Black men ≥40 yr of age with biopsy confirmed adenocarcinoma of the prostate diagnosed between January 2004 and December 2013. We defined definitive therapy as the receipt of either radical prostatectomy or radiation therapy (either brachytherapy or external beam) within 180 d of initial diagnosis, per previous publication standards [14]. We further restricted our cohort to individuals in whom definitive treatment indications were not controversial. Thus, we excluded cases with clinical metastatic ($n = 26$ 326) or node positive ($n = 5699$) disease, Gleason Score <7 ($n = 403$ 747), or unspecified Gleason Score ($n = 30$ 551). We also excluded patients receiving radiotherapy other than brachytherapy or external-beam radiation therapy ($n = 253$), or receiving palliative care ($n = 1043$).

Finally, we excluded facilities that treated less than 50 White and 50 Black patients throughout the study period ($n = 206$ 653). This threshold was chosen to maintain a representative cohort of patients without being subjected to significant variation from too few patients. These selection criteria yielded 283 135 assessable cases of PCa diagnosed in either White ($n = 223$ 873) or Black ($n = 59$ 262) men being managed at one of 356 unique CoC facilities.

2.3. Covariates

Baseline patient variables consisted of age at diagnosis, year of diagnosis, insurance type, race, percentage of adults within patient's home zip code without a high-school diploma quartiles, ZIP code level median income quartile, urban/rural/metropolitan status as defined by 2013 Rural-Urban Continuum Codes (https://www.ers.usda.gov/data-products/rural-urban-continuum-codes), census geographical region, prostate-specific antigen level (PSA), Gleason grade, and clinical T stage [15]. Comorbidity was assessed with the Charlson-Deyo comorbidity index (CCI) and categorized into 0, 1, and >1 as specified by NCDB [16]. CoC facility type was categorized as Community Cancer Program, Comprehensive Community Cancer Program, Academic/Research Program, Integrated Network Cancer Program, or Other (https://www.facs.org/quality-programs/cancer/accredited/about/categories). Missing variables were assigned to either "other" or "unknown" categories. Categories less than 1% in size were excluded from our multilevel models.

2.4. Statistical analyses

Frequencies and proportions were reported for categorical variables, while median and interquartile ranges were reported for continuous variables. Year squared and log PSA were used owing to skewed distributions. Differences in categorical and continuous variables were examined using the chi-square test and the Mann-Whitney test, respectively. A logistic regression with tests for interaction between year and race was used to assess for trends in definitive therapy among White and Black men between 2004 and 2013.

We generated a ranked list of the 356 facilities in our cohort ordered by the percent difference in Whites versus Blacks receiving definitive therapy (here on out referred to as "delta"). A delta >0 indicates a greater percentage of Whites receiving definitive therapy, whereas a delta <0 indicates a greater percentage of Blacks receiving definitive therapy at a particular facility. Standard errors were calculated and used to generate 95% confidence intervals for the delta at each facility.

A multilevel logistic regression model with a random effect to capture potential clustering in each CoC facility was fitted to predict the odds of receiving definitive therapy for prostate cancer. A priori tests for interaction between race and main effects were introduced into our model one by one and the Wald test was used with a multiplicative term. Only significant interaction terms were included in the final model. Covariates included patient CCI, Gleason grade, PSA, clinical T stage, sociodemographic status, and facility characteristics. Education level was removed from our regression after sensitivity analyses comparing nonclinical factors such as income and education level revealed colinearity (Supplementary Table 2). All main effect and interaction terms were adjusted for in our final model.

All analyses were performed using SAS 9.4 (SAS Institute, Inc., Cary, NC, USA), with a two-sided significance level set at $p < 0.05$. An institutional review board waiver from Brigham and Women's Hospital was obtained prior to conducting this study.

3. Results

White men comprised 79% ($n = 223$ 873) of the 283 135 cases diagnosed with PCa between 2004 and 2013,