Racial Disparity in Localized Prostate Cancer Mortality

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Abstract: This study aims to examine racial differences in all-cause mortality between African American (AA) and non-African American localized prostate cancer patients. This study advances academic discussion by being among the first to use a sample more representative of the general population that is different from certain subpopulations examined in literature. This study adopted a retrospective cohort study design using the Florida Cancer Data System. The hierarchical logistic regression was employed to analyze mortality in 2004 among living patients with localized prostate cancer from baseline 2000. Among 9617 patients, the odds of mortality in AAs were 57.6% higher than the non-AAs (Adjusted OR = 1.576, 95% CI: 1.243–1.999). Among prostate cancer patients, AA, older age, unmarried status, conservative treatment, Medicaid, and tumor grade III diagnosis predicted higher mortality relative to the reference group. Screening programs at a younger age can be considered, family and community support and aggressive treatments are suggested to prevent AA against adverse health outcomes.

Keywords: Racial disparity■Prostate cancer■Mortality■Sociology

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INTRODUCTION

Prostate cancer is the most frequently diagnosed cancer aside from skin cancer and the second leading cause of cancer mortality in men. Its death rates in African Americans remain more than twice as high as those in Whites.[1,2] Compared to non-African Americans, African Americans are more likely to have underutilization of screening services,[3,4] and a higher prostate specific antigen (PSA).[5] African Americans are also more likely to have a higher tumor grade and a more advanced tumor stage at diagnosis.[6,7] Even with similar clinical staging, Black men still have a higher mortality than White men.[1,2,8] African Americans are also more likely to have conservative rather than aggressive treatment[9–14] and lower socioeconomic status (SES).[15,16] SES differences explain a large portion of the racial disparity in prostate cancer mortality.[17,18]

These mortality differences persist even if tumor grade, stage and SES are adjusted.[19–21] This knowledge may suggest that reasons, such as genetics, patient perception, access to healthcare system, health seeking behaviors and compliance may justify race as an independent predictor for mortality. Specifically, Black men may differ systematically from other races in these areas, and thus, have higher cancer mortality.

Although African American did not differ statistically significantly from non-African American in metastasis prostate cancer mortality after controlling for biological and social factors,[22] the relationships between races and mortality in localized prostate cancer were controversial among empirical evidence. A retrospective study using data from the Department of Defense Cancer Registry,[23] for example, identified no significant difference in all-cause mortality between African American and non-African American localized prostate cancer patients, after controlling for age, tumor grade, and stage. By contrast, a significant relationship between race and localized prostate cancer mortality was reported in another representative study using the Surveillance, Epidemiology and End Results (SEER)-Medicare database.[24] Both the all-cause and cancer specific mortality rates in this study were higher in African American patients than White or Hispanic after controlling for age, tumor grade, comorbidity, and education, although the relationship was no longer significant after further adjusting for poverty, income, or composite socioeconomic variables.

Besides mixed findings, prior studies suffered from gaps that limit external validity of their findings. These two representative studies examined the research question among certain subpopulations, specifically, the subpopulation of the elderly, or active-duty or retired military personnel and dependents, thus lacking broad generalizability. The current study advances the academic discussion by filling this gap by being among the first to examine empirical evidence using a sample more representative of the general population, rather than using subpopulations with split results.

As mixed findings on localized prostate cancer mortality existed due to different subpopulations examined, this current study aimed to shed light on this uncertainty by using a more general study population. Research on localized prostate cancer, an early phase of this cancer, will identify whether racial disparity in mortality exists. If so, findings of significant predictors that can be intervened will provide recommendations on effective interventions to prevent localized cancer from developing into an

advanced stage for African Americans, and to aid to eliminate long-term racial disparities in mortality. Clarification of racial difference in localized prostate cancer mortality will contribute to the important goal of public health, specifically, the reduction of health disparities, which has been recognized as a priority issue by the National Institutes of Health.[25]

METHODS

Data source

The Florida Cancer Data System (FCDS) was used in this study.[26] This database has collected incidence reports on all new cancer cases in Florida since 1981. Data was verified and validated after its reception from all hospitals, radiation facilities, ambulatory and surgical centers, pathology laboratories, and physician offices. The FCDS has millions of incidences of cancer records and captures more than 95% of all incidences of cancer cases in Florida within one year of diagnosis. The duplicate cases are less than 0.1% and the missing demographic data are less than 3%. This public available data contain measures including patient's demographics, tumor characteristics, type of health insurance at diagnosis, treatment type and procedure, and vital status. A retrospective cohort study design was employed using FCDS in this study.

Study population

The FCDS used the International Classification of Diseases-Oncology, 3rd edition (ICD-O-3) to code the primary site of cancers; and the code of 51 was utilized to identify prostate cancer patients within the FCDS. The study population included all patients aged 18 years and older with localized prostate cancer diagnosed in Florida in 2000. Since localized cancer was coded as T1 in the "stage" variable, all the cases whose stage value was not T1 were excluded. In addition, approximately 400 cases with any missing data were excluded. 9617 localized prostate cancer cases were included in this study and were followed up with mortality for five years.

Study variables

Dependent variables. The outcome of interest for this study was all-cause mortality by Dec 31, 2004. This current study examined all-cause mortality instead of prostate cancer specific mortality, as both biological and socioeconomic factors can affect racial disparities in mortality. The all-cause mortality may better capture the effects of patient overall health status instead of cancer specific conditions, and the effects of contextual factors, such as ratio of number of physicians to cancer patients in a community. This dichotomous mortality variable had the code of 0 for being alive and 1 for death.

Independent variables. Race was considered the major explanatory variable in this study. It was originally coded as the categories of Caucasian, African American, Hispanic, and others in the FCDS. Given the objective of this study, Caucasian and Hispanic were combined into non-African American. After combination, a dummy variable for race was then created with 0 for non-African Americans and 1 for African Americans.

Covariates. Based on data availability in the FCDS, age, tumor grade, marital status, insurance type, and treatment type were included in this study.

Age was considered as a continuous variable. The cancer stage at diagnosis was determined by the TNM system in FCDS, which evaluated the size of the tumor, the extent of involved lymph nodes, any metastasis, and cancer grade. Four stages (I−IV) were usually grouped. T1 was determined when a tumor was present, but not detectable clinically or with imaging. If the patient was diagnosed with localized prostate cancer, tumor stage was labeled as early-stage, whereas if the patient was diagnosed with regional or distant then tumor stage was labeled as late-stage. In conjunction to stage status, the Gleason system for tumor grade was used to indicate the likely aggressiveness of this cancer: well differentiated was the most normal tissue, and poorly differentiated was the least normal tissue. These categories of "well differentiated" (Grade I), "moderately differentiated" (Grade II), and "poorly differentiated" (Grade III) corresponded to the Gleason score of 2−4, 5−6, and 7−10, respectively, which persisted in SEER and other databases. Two dummy variables were set up for tumor grade: one for grade II and the other for grade III. Grade I was used as the reference group.

Marital status, a dichotomized variable, had a code of 1 for being married and 0 for unmarried. The married group referred to the married status, including common law couples. The unmarried group included never married, separated, divorced, and widowed status. Insurance was classified into 16 types. It was re-coded into five types: uninsured, privately insured by a health maintenance organization (HMO) or a Preferred Provider Organization (PPO), Medicaid, Medicare, and others. Four insurance dummy variables were created with the uninsured category as the reference group. The therapeutic modalities were also dichotomized into conservative treatment and aggressive treatment, where radical prostatectomy, external beam radiation or brachy therapy were grouped as the aggressive treatment. The conservative treatment type included hormone therapy and chemotherapy, which was used as the reference group.