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Association between ethnicity and prostate cancer outcomes across hospital and surgeon volume groups

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ABSTRACT

Objective: We analyzed the association between ethnicity and outcomes among prostate cancer patients across hospital and surgeon volume groups.
Methods: In this retrospective cohort study using SEER–Medicare databases for the period between 1995 and 2003, prostate cancer cases were identified and retrospectively followed for one year pre- and up to eight years post-diagnosis. Based on volume, hospitals and surgeons were divided into three groups each. For each group, we fitted separate models to analyze the association between ethnicity and outcomes such as complications, eight-year mortality and cost, adjusting for covariates. Poisson (zero inflation), generalized linear model (log-link), and Cox regression models were used.
Results: African American ethnicity was associated with 30-day complications among medium volume hospital group. African American patients receiving care at medium volume hospitals and from medium volume surgeons had higher costs. Hispanic patients receiving care at low and medium volume hospitals had lower cost compared to white patients. Hispanic patients receiving care from a high-volume surgeon experienced increased hazard of long-term mortality.
Conclusions: Association between ethnicity and outcomes varies across hospital and surgeon volume groups. Thus, volume based policy measures may need further exploration for understanding the interaction between structure, process, volume and outcomes.

1. Introduction

Prostate cancer is the most common cancer diagnosis among men in the US [1]. A majority of these patients are diagnosed with localized stage. Radical prostatectomy is one of the common treatment options for localized prostate cancer. Disparities exist in the quality of prostate cancer care across regions, hospital settings, age and racial and ethnic groups [1–9]. Previous studies indicate that race and ethnicity are important predictors of treatment and outcomes for prostate cancer [1–5,7–9]. Understanding the determinants of ethnic and racial disparities in treatment, mortality, health resource utilization and cost is crucial for developing effective healthcare policies to improve quality of care of older prostate cancer patients [3,9].

Hospital and physician characteristics, particularly volume, play an important role in the variations in prostate cancer care outcomes such as cost, health resource utilization, complications and mortality [2–9]. Additionally, physician and hospital volume may influence the racial

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and ethnic disparity in prostate cancer care and outcomes [1–9]. Hospital and physician volume is often considered as surrogate for quality of care, and some researchers have suggested that referring (or redirecting) patients from low-volume to high-volume provider may improve quality and reduce health resource utilization and cost [6,9]. In men undergoing prostatectomy, the rates of postoperative and late urinary complications were lower for high-volume hospitals and for surgeons who perform a higher number of such procedures [10–18]. Thus, hospital and surgeon volume can have implications for short and long-term outcomes. In an earlier study, Ellison et al. reported that hospital volume is inversely related to in-hospital mortality, length of stay and hospital charges for men receiving radical prostatectomy [11–12]. Later, using Medicare data, Hu et al. reported that surgeon volume, but not the hospital volume, is inversely related to in-hospital complications and length of stay [15]. In a more recent study, Gooden et al. using Surveillance, Epidemiology, and End Results (SEER)–Medicare data reported that both hospital and physician volumes were not associated with reduced racial differences in recurrence-free survival after radical prostatectomy [13]. These studies are informative and our study aims to further addresses the issues such as racial and ethnic disparity in post-treatment complications and cost that were not addressed by these earlier studies. Such assessment can help us in better understanding the volume based policy measures so as to reduce the disparity in treatment, quality of care and outcomes. Hence, the objective of this study was to analyze the association between ethnicity and outcomes (complications, mortality and cost of care) across hospital and surgeon volume groups among elderly prostate cancer patients treated with radical prostatectomy using SEER–Medicare linked data. We hypothesized that older African American, Hispanic and white prostate cancer patients receiving surgery from a high-volume hospital and a high-volume surgeon will have lower complications, lower annual cost, and lower eight-year mortality.

2. Methods

2.1. Data sources and study sample

We developed a retrospective cohort design using the linked SEER–Medicare database for the period 1995–2003. All African American, Hispanic and white men, aged 66 years or older, diagnosed with prostate cancer (ICD codes: 185, 233.4, 236.5) between 1995 and 1998 and treated with radical prostatectomy as the primary treatment ($n = 7950$) were identified and followed retrospectively for one year prior to diagnosis and up to eight years post-diagnosis. The SEER–Medicare linked database brings together Medicare administrative claims data and clinical tumor registry data for Medicare recipients, and offers an excellent opportunity for meaningful outcomes research in prostate cancer [19]. The SEER program collects data on cancer incidence, treatment and mortality in a representative sample of the US population and includes thirteen sites, encompassing wide geographic and population variation. The current SEER catchments area is estimated to include 14% of the US population. Cancer cases in SEER are primarily identified from hospital records. With the exception of individuals who are enrolled in HMOs or do not have Part B coverage, Medicare data provides information about all inpatient and outpatient utilization for residents of the US 65 years or older. Survival data was determined by Medicare vital statistics as well as SEER linkage to death certificates (National Death Index). The SEER–Medicare file contains one record for each Medicare beneficiary in the SEER program, integrating the individual's SEER and Medicare records [19]. The SEER–Medicare is a de-identified secondary database and released for public access for research purposes. The study was reviewed and approved by the institutional review board.

Of persons diagnosed with cancer at age 65 years or older and enrolled in SEER registries, 93% have been matched with their Medicare enrollment records, in a linked customized file—the Patient Entitlement and Diagnosis Summary File (PEDSF). In addition to diagnostic information, this file provides Medicare entitlement, utilization and census tract and zip code based socioeconomic data. The SEER database provides characteristics of the tumor that are crucial to adequately adjust for prostate cancer severity, including histology, stage and grade. SEER also provides information on extent of disease that may have prognostic significance such as the size of the primary tumor and the extent and location of lymph node involvement. Men under 66 years of age at the time of diagnosis were excluded from our study to ensure that the data file included sufficient claims for medical care prior to diagnosis to allow for comorbidity adjustments. This also allowed us to assess the diagnostic procedures prior to cancer diagnosis. The lists of procedure codes, revenue center codes and service codes were reviewed to ensure that appropriate codes are used for each year, since HCPCS codes change over time.

2.2. Key dependent variables: complications, mortality, and cost

The dependent variables for our analysis were mortality, complications and costs. All cause mortality was obtained from the vital status variable in Medicare claims data. In case the Medicare vital status variable was missing, the SEER death indicator in the PEDSF file was used. Time to death was calculated as the time between date of diagnosis and date of death, and for patients that were alive at the end of follow-up, the observations were censored. We identified complications that occur during either the index hospitalization or any other hospital admission, within 30 days of the date of radical prostatectomy treatment. Based on an earlier study by Alibhai et al., we studied complications after radical prostatectomy for prostate cancer and grouped them into seven mutually exclusive categories: respiratory, cardiac, vascular, wound/bleeding, genitourinary, miscellaneous medical and surgical [20]. Direct medical care (DMC) costs were defined as the reimbursements received from Medicare by respective health care organization for period of one year post-treatment [21]. The total DMC costs include costs of care provided by physicians and other health professionals, care provided in