



## Original Article

# Racial disparity in quality of care and overall survival among black vs. white patients with muscle-invasive bladder cancer treated with radical cystectomy: A national cancer database analysis

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## Abstract

**Objectives:** To examine the impact of race on quality of care and overall survival (OS) among patients with muscle invasive bladder cancer (MIBC) treated with radical cystectomy (RC) in the U.S.

**Materials & Methods:** Our cohort consisted of 12,652 patients receiving RC for MIBC within the National Cancer Database from 2004 to 2012. Patients were stratified by race (Black non-Hispanic vs. White non-Hispanic) and imbalances in patient characteristics mitigated using propensity score weighting. Logistic and Cox regressions examined the impact of race on quality of care metrics (receipt of pelvic lymph node dissection (PLND), lymph node count, hospital volume, length of stay, delay of treatment) and on OS. The difference in OS was expressed as Delta, and stratified by facility-type, hospital volume, and region.

**Results:** Blacks were less likely to receive PLND (odds ratio [OR] 0.70, 95% confidence interval [CI]: 0.55–0.91), or to have a greater number of lymph nodes removed (OR 0.76, 95%CI: 0.64–0.90). They exhibited greater length of stay (OR 1.34, 95%CI: 1.13–1.59), and delay of RC among recipients of neoadjuvant chemotherapy (OR 2.59, 95%CI: 1.77–3.85) (all  $P \leq 0.001$ ). Notably, utilization of neoadjuvant chemotherapy in advanced disease stages was more common in blacks (OR 2.82, 95%CI: 1.93–4.13,  $P < 0.001$ ). Additionally, Black race was associated with inferior OS (Hazard ratio 0.87, 95%CI: 0.79–0.97,  $P < 0.014$ ). Disparities in OS varied based on facility type and geographical region, but not hospital volume. Specifically, Blacks had worse OS when treated in a community cancer program (Delta 0.42, 95%CI: 0.28–0.57,  $P < 0.001$ ), or within New England/Middle Atlantic region (Delta 0.16, 95% CI: 0.07–0.24,  $P < 0.001$ ).

**Conclusion:** Black race is an independent predictor of inferior quality of care and OS in patients undergoing RC for MIBC. Survival disparities vary based on geographical region and facility type. Notably, the OS disparity appears to have narrowed in comparison to previous studies. © 2018 Elsevier Inc. All rights reserved.

**Keywords:** Health care disparities; Health care; Urinary bladder neoplasms; Cystectomy

## 1. Introduction

With an estimated 79,030 new diagnoses and 16,870 deaths in 2017, bladder cancer is the 5th most common cancer in the U.S. and conveys the highest mortality among

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urological malignancies [1]. Despite the significant improvement seen in cancer survival over the last three decades, racial disparities are persistent and most pronounced in Black (non-Hispanic) men and women [2]. Black patients as compared to White (non-Hispanic) patients exhibit half the bladder cancer incidence but show significantly greater mortality. The corresponding 5-year cancer-specific survival (CSS) rates are 66.1% vs. 78.9%, respectively [3].

This difference in CSS might be, at least partially, explained by the lower utilization of radical surgical treatment, i.e. radical cystectomy (RC), in Black patients with American Joint Committee on Cancer (AJCC) stage II/III bladder cancer [4,5]. Indeed, survival differences are more pronounced in localized muscle invasive bladder cancer (MIBC) than nonmuscle invasive bladder cancer [6]. Noteworthy, even when Black patients with MIBC were appropriately treated with RC, previous reports suggested that these individuals received lower quality of care, as measure by access to high surgical/hospital volume, pelvic lymph node dissection (PLND) utilization, continent diversion utilization, and length of stay [4,7–9]. Yet, these reports have not provided long-term mortality data, and given the high aggressiveness of MIBC, it is plausible that these treatment disparities would translate into an inferior OS among Black individuals.

To date, studies that assess racial survival disparities explicitly in patients undergoing RC for MIBC are limited. As such, it remains unclear if Black race is a predictor of less favorable bladder cancer outcomes and what could be driving this difference in outcomes [10,11]. To address this void, we utilized the National Cancer Database (NCDB), and set to compare Black vs. White patients undergoing RC for localized MIBC in terms of quality of surgical care and OS. We hypothesized that Black patient would receive an inferior quality of care, and have less favorable OS. We also hypothesized that survival disparities would vary based on facility type, surgical volume, and geographical region.

## 2. Patients and methods

### 2.1. Data source

Established in 1989 as a joint program by the Commission on Cancer (CoC), and the American Cancer Society, the NCDB is a nationwide database that contains patterns of cancer care and treatment outcomes of 29 million cases. Data are collected at 1,500 participating CoC-accredited programs in the United States (U.S.) and Puerto Rico by trained data abstractors using a standardized methodology (<http://www.facs.org/cancer/coc/fordsmanual.html>). The NCDB is the largest cancer registry in the world and approximately 70% of newly

diagnosed tumors in the U.S. are reported to the NCDB [12].

### 2.2. Patient selection

Out of 391,214 men and women diagnosed with bladder cancer between 2004 and 2012 (ICD-O-3 code C67.0–C67.9) we selected patients of Black non-Hispanic or White non-Hispanic race (from here on referred to as Black and White) with clinically localized, muscle invasive (cT2–T4 N0M0) carcinoma of the bladder.

Patients were excluded if they had not received radical cystectomy as a first course of treatment ( $n=29,068$ ), if they had missing follow-up information ( $n=36$ ), or were diagnosed <40 years of age ( $n=64$ ), as facility information on these patients is censored within the NCDB due to confidentiality reasons. This resulted in a final study cohort of 12,652 patients (study cohort exclusion/inclusion criteria are depicted in Fig. 1).

### 2.3. Covariates

Baseline demographic and socioeconomic covariates consisted of age at diagnosis, sex, race (Black or White), year of diagnosis (2004–2012), insurance status (not insured, private, public [Medicaid, Medicare, other government], or unknown), percentage of adults within patient's home zip code without a high school diploma quartile (<7%, 7%–12.9%, 13%–20.9%,  $\geq 21\%$ ), ZIP code level median income quartile (<\$38,000, \$38,000–\$47,999, \$48,000–\$62,999, or  $\geq \$63,000$ ), urban/rural status (metropolitan, urban, rural, or unknown), and census geographical region (New England, Middle Atlantic, South Atlantic, East North Central, East South Central, West North Central, West South Central, Mountain, Pacific).

Disease characteristics consisted of clinical tumor stage and histologic type (urothelial vs. nonurothelial). Comorbidity was assessed using the Charlson-Deyo comorbidity index and categorized into 0, 1, and >1 as specified by NCDB.

CoC facility type was categorized as Community Cancer Program (CCP), Comprehensive Community Cancer Program, Academic/Research Program, Integrated Network Cancer Program, or Other. Full description of these nominations is available on <https://www.facs.org/quality-programs/cancer/accredited/about/categories>. Finally, hospital volume was calculated based on the number of annual RCs performed at an individual institution, and categorized using quartiles [13].

### 2.4. Outcomes

Our study had two main endpoints: quality of care measures, and OS. For the former, we utilized several measures that have been previously described [5,7,14]. These consisted of (1) structural measures including time to treatment

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