Understanding the Impact of Race on Outcomes Among BCG-treated High-Risk Non-Muscle Invasive Bladder Cancer Patients in an Equal Access Setting

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Purpose

Black patients have worse bladder cancer outcomes than any other race. We describe real-world bladder cancer outcomes as a function of race among high-risk non-muscle invasive bladder cancer (NMIBC) patients managed in the largest equal access setting in the United States (US): The Veterans Affairs (VA) Health System.

Background

Approximately 75% of newly diagnosed bladder cancers are non-muscle invasive bladder cancer (NMIBC), however, death is exponential once disease invades the muscle which can be stratified into low, intermediate and high-risk for progression to muscle invasion. Patients with high-risk NMIBC which include carcinoma in-situ (CIS), high grade papillary, and/or T1 tumors are at increased risk for progression.

Racial disparities in bladder cancer care and outcomes have been previously described. For over 30 years, Blacks have persistently had worse bladder cancer-specific survival than any other race/ethnic group. Specifically, on a population level, Blacks with bladder cancer have been found to have up to 2-fold increased risk of bladder cancer-specific death than Whites. While socioeconomic and access-to-care differences between races in bladder cancer have been identified, there remains lack of investigation regarding racial differences in bladder cancer care in an equal access system. We sought to describe treatment patterns and outcomes among high-risk NMIBC in the largest equal access healthcare system in the US: the Veterans Affairs (VA). We hypothesized that Blacks and Whites will have similar treatment patterns resulting in similar risks of progression, recurrence, and survival.

Methods

Using inpatient and outpatient data and fee-basis claims (i.e. care provided outside the VA system for which the VA paid for), we queried data from the VA Informatics and Computing Infrastructure (VINCI) to identify bladder cancer patients seen at any VA Health System site from January 1, 2010 to December 31, 2015.

We retrospectively identified a sample of 412 high-risk NMIBC patients from 63,139 patients diagnosed with bladder cancer that received ≥1 dose of BCG within VA centers across the US from January 1, 2000, to December 31, 2015. We used the Kaplan-Meier method to estimate outcomes including event-free survival and Cox regression to determine association between race and recurrence, progression, disease-specific survival and overall survival outcomes.

Results

Follow-up was 2,694 person-years. Out of 412 patients, 50 (12%) and 345 (84%) were Black and White, respectively.

There was no difference in age, sex, smoking status, and Charlson Comorbidity Index by race. Black patients had lower socioeconomic status (SES) with greater percentage of patients living below the poverty level than White (50% vs. 21%, p<0.001) patients, respectively.

A total of 392 (95%) patients received adequate induction BCG and 152 (37%) patients received adequate maintenance BCG therapy. There was no significant difference in rates of adequate induction or maintenance BCG therapy according to race.

There was no significant difference in recurrence (Hazard Ratio (HR) 1.43; 0.65-3.18), progression (HR 0.87; 0.40-1.91), disease-specific survival (HR 1.21; 0.36-4.06), and overall survival (HR 1.38; 0.69-1.89) according to Black vs. White race, respectively.

Table 1: Association between race and outcomes in NMIBC patients

	Univariable Cox		Multivariable Cox	
(Reference=White)	HR (95% CI)	p-value	HR (95% CI)	p-value
Recurrence-free			Model 1*	
Black	1.43 (0.65, 3.18)	0.378	1.42 (0.56, 3.55)	0.460
Other/Unknown	1.35 (0.42, 4.36)	0.612	2.17 (0.60, 7.85)	0.239
Progression-free			Model 2**	
Black	0.87 (0.40, 1.91)	0.730	0.75 (0.32, 1.80)	0.525
Other/Unknown	0.63 (0.15, 2.57)	0.519	0.53 (0.13, 2.19)	0.377
Overall survival			Model 3**	
Black	1.38 (0.69, 1.89)	0.619	1.00 (0.58, 1.74)	0.998
Other/Unknown	1.49 (0.76, 2.93)	0.248	1.23 (0.61, 2.49)	0.558
BC specific survival			Model 4**	
Due to BC				
Black	1.21 (0.36, 4.06)	0.759	1.20 (0.34, 4.27)	0.783
Other/Unknown	2.10 (0.49, 8.94)	0.318	1.94 (0.42, 8.95)	0.398

*Adjusted for age at diagnosis, gender (female vs. male), smoking status (former vs. current vs. never), CCI (0-2 vs. 3-4 vs. 5+), SES, year of diagnosis, and adequate BCG therapy (yes vs. no).

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Figure 1. KM curve of recurrence-free survival stratified by race

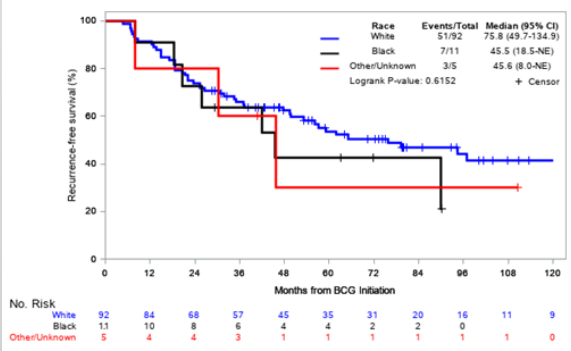


Figure 2. KM curve of progression-free survival stratified by race

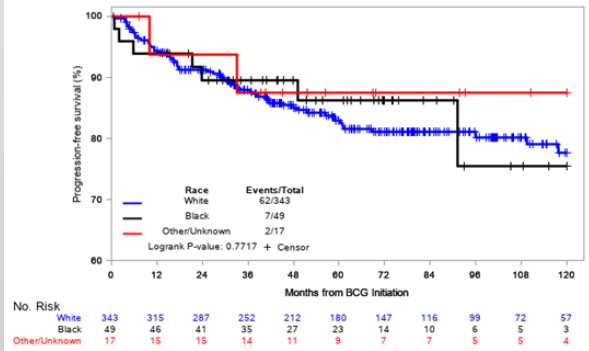
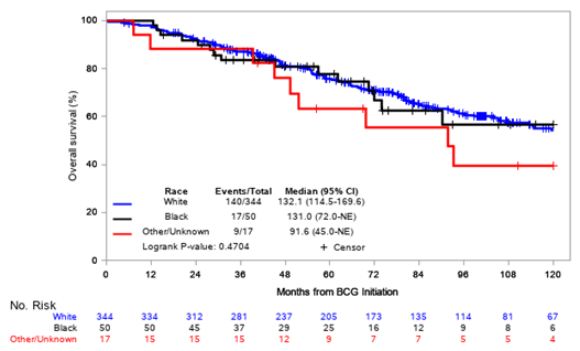


Figure 3. KM curve of overall survival stratified by race



Conclusions

While treatments for bladder cancer are associated with substantial costs, we showed radical cystectomy had comparable total costs when compared to partial cystectomy among patients with muscle-invasive bladder cancer.

However, partial cystectomy resulted in worse cancer-specific survival further supporting radical cystectomy as a high-value surgical procedure for muscle-invasive bladder cancer.