

Geographic Distribution of Racial Differences in Mortality in Muscle-Invasive Bladder Cancer Patients: An Opportunity for Improvement

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Purpose

To determine the geographic distribution of muscle-invasive bladder cancer (MIBC) mortality according to race in the United States (US). African Americans (AAs) have up to two times the risk of bladder cancer-specific mortality (BCSM) compared to Caucasians. BCSM increases exponentially once it invades the muscle. Geographic heterogeneity in bladder cancer mortality according to race remains to be determined.

Background

The prevalence of ethnic and racial groups varies considerably between regions of the United States (US). As there is evidence supporting racial differences in bladder cancer mortality, differences may exist between these geographic areas by extension. Access to adequate health care and insurance may influence these variations as well.

Geographic heterogeneity in bladder cancer mortality has previously been reported. Other conditions, such as cardiovascular disease, have shown county level variations in mortality, allowing for targeted interventions to reduce disparities in patient care. Current literature remains sparse regarding how racial differences in bladder cancer mortality is accentuated by geographic distribution. We hypothesize AAs will have a higher risk of bladder cancer-specific mortality (BCSM) compared to other races which will vary according to region, stage of disease, and disease management. Using data from a nationally representative cancer dataset, we aimed to determine the race-specific geographic distribution in mortality of muscle-invasive bladder cancer.

Methods

Analysis of Surveillance, Epidemiology, and End Results (SEER)-Medicare data for 6,044 patients aged 66-85 diagnosed with clinical stage T2-T4 N0M0 bladder cancer from January 1, 2002 to December 31, 2011.

Fine and Gray competing risks regression models were used to assess the association of race with BCSM according to tumor registry.

Registries were ranked based on the adjusted hazard ratio (AHR) of BCSM for AAs vs Caucasians. We performed AHR for different stages and treatments, respectively.

Results

Out of 6,044 patients, 5,408 (89.5%) were Caucasian, 352 (5.82%) were AA, 85 (1.4%) were Hispanic, and 199 (3.29%) were other.

Of the 18 registries, AAs with bladder cancer were largely concentrated in Louisiana (19%), New Jersey (17.9%) and Georgia (17.6%).

New Jersey was the only registry where AAs had increased risk of BCSM than Caucasians and only for stage T2 disease: (AHR, 1.74; 95% CI 1.22-2.47, P=0.002).

According to treatment, AAs in New Jersey had worse BCSM than Caucasians when they underwent radical cystectomy (AHR, 2.05; 95% CI 1.26-3.35, P=0.0039) and radiotherapy or chemotherapy alone (AHR, 1.55; 95% CI 1.03-2.35, P=0.0367).

Table 1. Population With Bladder Cancer by Race Within Each Registry

Registry	No. (%)					P value
	Total (N = 6044)	White (N = 5408)	AA (N = 352)	Hispanic (N = 85)	Other/Unknown (N = 199)	
Atlanta (Metropolitan)	147 (2.4)	128 (2.4)	17 (4.8)	-	-	<0.001
Connecticut	367 (6.1)	346 (6.4)	10 (2.8)	-	-	
Detroit (Metropolitan)	347 (5.7)	291 (5.4)	51 (14.5)	-	-	
Greater California	1161 (19.2)	1069 (19.8)	20 (5.7)	32 (37.6)	40 (20.1)	
Greater Georgia	553 (9.1)	488 (9.0)	62 (17.6)	-	-	
Hawaii	61 (1.0)	24 (0.4)	0 (0.0)	-	37 (18.6)	
Iowa	317 (5.2)	313 (5.8)	3 (0.9)	-	-	
Kentucky	465 (7.7)	449 (8.3)	16 (4.5)	-	-	
Los Angeles, California	314 (5.2)	246 (4.5)	20 (5.7)	15 (17.6)	33 (16.6)	
Louisiana	417 (6.9)	344 (6.4)	67 (19.0)	-	-	
New Jersey	987 (16.3)	897 (16.6)	63 (17.9)	-	20 (10.1)	
New Mexico	155 (2.6)	132 (2.4)	-	15 (17.6)	-	
Rural Georgia	-	11 (0.2)	-	-	-	
San Francisco-Oakland metropolitan statistical area, California	-	139 (2.6)	-	-	16 (8.0)	
San Jose-Monterey, California	-	108 (2.0)	-	-	13 (6.5)	
Seattle (Puget Sound), Washington	-	315 (5.8)	-	-	12 (6.0)	
Utah	-	108 (2.0)	-	-	-	

Table 2. Adjusted Hazard Ratio Analysis With Stage 2 Through 3 Disease for Bladder Cancer-Specific Mortality Among the AA Population Stratified by Region

Registry	AHR (95% CI)	P Value
Clinical Stage 2		
Atlanta (Metropolitan)	1.21 (0.54, 2.71)	0.6468
Connecticut	0.49 (0.14, 1.71)	0.2646
Detroit (Metropolitan)	1.02 (0.64, 1.61)	0.9357
Greater California	1.47 (0.84, 2.60)	0.1811
Greater Georgia	1.14 (0.79, 1.65)	0.4945
Hawaii	1.21 (0.54, 2.71)	0.6468
Iowa	0.41 (0.04, 4.36)	0.4582
Kentucky	0.48 (0.17, 1.32)	0.1557
Los Angeles, California	0.83 (0.39, 0.73)	0.6129
Louisiana	0.94 (0.61, 1.45)	0.789
New Jersey	1.74 (1.22, 2.47)	0.0021
New Mexico	1.24 (0.09, 16.40)	0.8696
Rural Georgia	1.21 (0.54, 2.71)	0.6468
San Francisco-Oakland metropolitan statistical area, California	1.63 (0.61, 4.40)	0.3334
San Jose-Monterey, California	1.17 (0.10, 13.25)	0.8993
Seattle (Puget Sound), Washington	0.87 (0.19, 3.96)	0.8527
Utah	-	-

Table 3. Adjusted Hazard Ratio Analysis According to Treatment Type for Bladder Cancer-Specific Mortality Among the AA Population Stratified by Region

Registry	AHR (95% CI)	P Value
No Curative treatment		
Atlanta (Metropolitan)	1.07 (0.48, 2.39)	0.8752
Connecticut	0.49 (0.14, 1.73)	0.2652
Detroit (Metropolitan)	0.97 (0.58, 1.63)	0.9182
Greater California	1.37 (0.77, 2.44)	0.2878
Greater Georgia	1.09 (0.70, 1.71)	0.6954
Hawaii	1.07 (0.48, 2.39)	0.8752
Iowa	0.38 (0.03, 4.14)	0.424
Kentucky	0.43 (0.15, 1.21)	0.11
Los Angeles, California	0.76 (0.36, 1.60)	0.4641
Louisiana	0.87 (0.55, 1.39)	0.5724
New Jersey	1.61 (1.09, 2.37)	0.0168
New Mexico	0.82 (0.06, 11.06)	0.878
Rural Georgia	1.07 (0.48, 2.39)	0.8752
San Francisco-Oakland metropolitan statistical area, California	1.48 (0.52, 4.20)	0.4605
San Jose-Monterey, California	1.09 (0.09, 12.81)	0.946
Seattle (Puget Sound), Washington	0.75 (0.16, 3.43)	0.7091
Utah	-	-
Radical Cystectomy		
Atlanta (Metropolitan)	1.36 (0.60, 3.11)	0.4597
Connecticut	0.62 (0.16, 2.35)	0.4835
Detroit (Metropolitan)	1.24 (0.70, 2.21)	0.4551
Greater California	1.75 (0.87, 3.54)	0.1186
Greater Georgia	1.40 (0.83, 2.36)	0.2115
Hawaii	1.36 (0.60, 3.11)	0.4597
Iowa	0.48 (0.04, 5.34)	0.5511
Kentucky	0.55 (0.19, 1.56)	0.2578
Los Angeles, California	0.97 (0.43, 2.15)	0.9323
Louisiana	1.12 (0.65, 1.91)	0.6836
New Jersey	2.05 (1.26, 3.35)	0.0039
New Mexico	1.04 (0.08, 13.56)	0.9745
Rural Georgia	1.36 (0.60, 3.11)	0.4597
San Francisco-Oakland metropolitan statistical area, California	1.89 (0.66, 5.42)	0.2335
San Jose-Monterey, California	1.39 (0.12, 16.67)	0.7938
Seattle (Puget Sound), Washington	0.96 (0.23, 4.06)	0.9528
Utah	-	-
Radiotherapy/Chemotherapy		
Atlanta (Metropolitan)	1.03 (0.48, 2.23)	0.9377
Connecticut	0.47 (0.13, 1.71)	0.253
Detroit (Metropolitan)	0.94 (0.58, 1.52)	0.8034
Greater California	1.32 (0.72, 2.42)	0.3632
Greater Georgia	1.06 (0.71, 1.57)	0.7852
Hawaii	1.03 (0.48, 2.23)	0.9377
Iowa	0.36 (0.03, 3.83)	0.3996
Kentucky	0.41 (0.14, 1.20)	0.1041
Los Angeles, California	0.73 (0.34, 1.56)	0.4161
Louisiana	0.85 (0.53, 1.34)	0.4704
New Jersey	1.55 (1.03, 2.35)	0.0367
New Mexico	0.79 (0.06, 10.67)	0.8579
Rural Georgia	1.03 (0.48, 2.23)	0.9377
San Francisco-Oakland metropolitan statistical area, California	1.43 (0.51, 4.01)	0.4946
San Jose-Monterey, California	1.05 (0.09, 11.75)	0.9668
Seattle (Puget Sound), Washington	0.72 (0.16, 3.25)	0.6727
Utah	-	-

NCT: Non-curative therapy, RC: Radical Cystectomy, TMT: Trimodal therapy, XRT: Radiation therapy

SEER-Medicare prohibits reporting cells <11 and/or derivation.

Conclusions

In our population-based cohort, we observed geographic variation in BCSM among AAs with MIBC. Specifically, we found worse BCSM among AAs vs. Caucasians in one registry with one of the largest population of AAs.

Moreover, we found AAs in this region had differing mortality rates compared to Caucasians when stratified by stage and treatment type.

These findings support further investigation into the social determinants of race (i.e. SES and distance to health care facility) and culturally centered healthcare decision-making which may drive these results.