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Racial and Socioeconomic Disparities in Bladder Cancer Survival: Analysis of the California Cancer Registry

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Abstract

The California Cancer Registry was analyzed for bladder cancer survival disparities based on race, socioeconomic status (SES), and insurance types. Survival analyses were performed for 72,452 cases to determine the prognostic significance of racial and socioeconomic factors. Black race, low SES, and Medicaid insurance portend poorer outcomes. These findings reflect a multifaceted socioeconomic and public health conundrum.

Purpose: To examine the California Cancer Registry (CCR) for bladder cancer survival disparities based on race, socioeconomic status (SES), and insurance in California patients.

Patients and Methods: The CCR was queried for bladder cancer cases in California from 1988 to 2012. The primary outcome was disease-specific survival (DSS), defined as the time interval from date of diagnosis to date of death from bladder cancer. Survival analyses were performed to determine the prognostic significance of racial and socioeconomic factors.

Results: A total of 72,452 cases were included (74.5% men, 25.5% women). The median age was 72 years (range, 18–109 years). The racial distribution among the patients was 81% white, 3.8% black, 8.8% Hispanic, 5.2% Asian, and 1.2% from other races. In black patients, tumors presented more frequently with advanced stage and high grade. Medicaid patients tended to be younger and had more advanced-stage, higher-grade tumors compared to patients with Medicare or managed care ($P < .0001$). Kaplan-Meier analysis demonstrated significantly poorer 5-year DSS in black, low SES, and Medicaid patients ($P < .0001$). When controlling for stage, grade, age, and gender, multivariate analysis revealed that black race (DSS hazard ratio = 1.295; 95% confidence interval, 1.212–1.384), low SES (DSS hazard ratio = 1.325; 95% confidence interval, 1.259–1.395), and Medicaid insurance (DSS hazard ratio = 1.349; 95% confidence interval, 1.246–1.460) were independent prognostic factors ($P < .0001$).

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Disclosure

The authors have stated that they have no conflict of interest.

Conclusion: An analysis of the CCR demonstrated that black race, low SES, and Medicaid insurance portend poorer DSS. These findings reflect a multifaceted socioeconomic and public health conundrum, and efforts to reduce inequalities should be pursued.

Keywords

Disease-specific survival; Insurance; Race; Socioeconomic status

Introduction

Bladder cancer is the sixth most common cancer in the United States and the second most common genitourinary cancer. There will be an estimated 80,470 newly diagnosed cases and 17,670 deaths due to bladder cancer in 2019.[1] Men are 4 times more likely than women to be diagnosed, and the incidence in white men is twice that of black men.[1–3] Overall, bladder cancer survival at 5 years was reportedly 92%, 50%, and 10% for localized, regional and distant disease, respectively, in a large population-based analysis.[4]

Disparities in bladder cancer diagnosis and treatment have been characterized by sociodemographic factors including race, insurance type, and socioeconomic status (SES); however, insight regarding the role of these factors in relation to bladder cancer survival is limited. Prior data suggest lower survival rates for black patients with bladder cancer compared to other races, though survival outcomes stratified by insurance type and SES have not been as extensively described.[2,4–6]

California has a diverse patient population, with minority groups accounting for 27% of the population, compared to 23% overall in the United States. Public insurance rates are also slightly higher in California, at 38.4%, compared to 35.5% nationally.[7] Specific to the state of California, the association of SES and race with prostate, breast, colorectal, and lung cancer outcomes are well described[8]; less is known regarding the influence of sociodemographic factors on bladder cancer outcomes.

We used the California Cancer Registry (CCR) to describe the association of race, insurance type, and SES with bladder cancer survival specifically in the state of California.

Patients and Methods

The principles of the Declaration of Helsinki were followed. This was an institutional review board exempt retrospective study using the CCR, a large, population-based cancer surveillance system containing data reported to the Cancer Surveillance Section of the Department of Public Health from hospitals and health care facilities that provide health care to cancer patients in California. The CCR was queried for all bladder cancer cases in California from January 1, 1988, through December 31, 2012. The exclusion criteria were age < 18 years, 2 or more cancers, and diagnosis solely on basis of death certificate or autopsy.

Bladder cancer histologic types were defined using the International Classification of Diseases for Oncology, Third Revision (ICD-O-3), codes for urothelial carcinoma,

squamous-cell carcinoma, adenocarcinoma, small-cell carcinoma, and other. Tumor stage at diagnosis was grouped according to 1 of 4 categories: localized, regional, distant, or unknown. Tumor grade was characterized as low grade (I and II), high grade (III and IV), or unknown.

Race was categorized into 5 groups, as listed in the CCR: white, black, Hispanic, Asian/Pacific Islander (PI), and other. Insurance type was divided into 5 categories: managed care, Medicare, Medicaid, other insurance, and not insured or unknown. In addition, SES was divided into 5 categories on the basis of quintiles of the Yost index of SES—lowest, lower middle, middle, higher middle, and highest—with each quintile representing 20% of the population.

The primary outcome measure in this study was disease-specific survival (DSS), defined as the time interval from date of diagnosis to date of death from bladder cancer. The secondary outcome was overall survival, defined as the interval from date of diagnosis to date of death by all causes. DSS was used as our primary outcome, as we were interested in the relationship between specific sociodemographic factors and bladder cancer-specific survival. To be sure, overall survival provides nonspecific information regarding survival associated with a cancer diagnosis.

Univariable Kaplan-Meier analysis was first performed to compare overall survival and DSS on the basis of patient race, SES, and insurance type. Multivariable Cox regression analysis controlling for stage, grade, age, and gender was performed to evaluate survival outcomes and identify prognostic factors. All statistical output was generated by SAS 9.4 software (SAS Institute, Cary, NC). An alpha level of 0.05 was considered significant; all tests were 2 tailed.

Results

A total of 72,452 cases of bladder cancer were included in this study (74.5% male and 25.5% female subjects) (Table 1). The median patient age was 72 years (range, 18–109 years). The majority of patients were white (81%); 8.8% of patients were Hispanic, 5.2% were Asian/PI, 3.8% were black, and 1.2% were from other races. Medicare-insured patients accounted for 30.4%, while Medicaid-insured patients accounted for 3.2%. The rest of the patients were uninsured, had managed care, or had other forms of insurance. Patients were stratified by SES into the following groups: highest (22.9%), higher middle (23%), middle (22.1%), lower middle (19.1%), and lowest (12.9%).

Race

The most common bladder cancer subtype was urothelial carcinoma (91.5%) (Table 1). Most patients presented with localized disease (77.3%), whereas 5.8% of patients presented with remote disease. Overall, 52.5% had high-grade disease, 38.5% low-grade disease, and 9% disease of unknown grade. Remote disease was present in 9.5% of black patients, 8.2% of Hispanic patients, 6.2% of Asian/PI patients, and 5.4% of white patients ($P < .0001$) (Table 2). The highest proportion of patients with high-grade disease were black patients (58.9%), followed by Asian/PI (56.8%), Hispanic (53.2%), and white (52.1%) patients ($P < .0001$).

Insurance Type

Medicaid patients had tumors with the highest stage and grade, and were more likely to be under the age of 60; remote disease was found in 13.4% of Medicaid patients compared to 5% to 6% in all other insurance status groups ($P < .0001$) (Table 3). High-grade disease was present in 57.6% of Medicaid patients, which was higher than in uninsured patients (45.3%) ($P < .0001$).

Socioeconomic Status

When considering the extremes of the SES groups, 5.0% of patients in the highest SES group had remote disease, while 7.4% of patients in the lowest SES group had remote disease ($P < .0001$) (Table 4). In addition, 52.2% of patients in the highest SES group had high-grade disease compared to 52.8% of those in the lowest SES group. Patients from the lowest SES group were more likely to have higher-staged tumors and slightly higher-grade disease than the highest SES group.

Kaplan-Meier and Multivariate Analysis

Kaplan-Meier analysis was performed comparing bladder cancer survival by race, insurance type, and SES group. Black patients exhibited the worst 5-year DSS among all races at 61.2% ± 1.0% (Figure 1A). White, Hispanic, and Asian/PI patients had 5-year DSS of 75.4% ± 0.1%, 73.3% ± 0.6%, and 75.5% ± 0.8%, respectively. Patients with Medicaid demonstrated the poorest survival among insurance types at 64.1% ± 1.1% (Figure 1B). Patients with Managed Care, Medicare, and other insurance had 76.4% ± 0.3%, 72.5% ± 0.3%, and 80.5% ± 0.6%, respectively. The lowest SES group had the worst survival compared to all other SES groups at 70.2% ± 0.5% (Figure 1C). SES correlated linearly and directly with DSS. On multivariate analysis controlling for age, gender, cancer stage and grade, black race (DSS hazard ratio = 1.295, 95% confidence interval, 1.212–1.384, $P < .0001$) was independently prognostic for poor DSS (Table 5). Similarly, patients with Medicaid insurance (DSS hazard ratio = 1.349, 95% 1.246–1.460, $P < .0001$), and lowest SES (DSS hazard ratio = 1.325; 95% confidence interval, 1.259–1.395; $P < .0001$) were independent negative prognostic factors.

Discussion

An understanding of cancer staging and biology at the time of diagnosis permits insight into sociodemographic disparities pertaining to cancer diagnosis and access to care. When compared by race, black patients are more likely to be diagnosed with higher grade and more advanced disease.[9,10] Additionally, black women are more likely than white women to have invasive cancer, while men from both groups were at equal risk.[11] Similarly, patients with Medicaid and patients who are uninsured often present with more advanced-stage tumors compared to privately insured and Medicare-insured patients.[12–14] Unemployment status and county poverty levels have also been associated with cancer metastasis at presentation.[15,16]

Our primary objective was to study the association of 5-year DSS for bladder cancer in California with race, insurance type, and SES. Multivariate analysis adjusting for age,

gender, stage, and grade demonstrated that black race, Medicaid insurance, and lowest SES portend a lower DSS. Interestingly, we found that in California, patients with Medicaid insurance experienced worse DSS than uninsured patients. Disparities in bladder cancer survival among black patients, patients with Medicaid insurance, and patients with a low SES are likely due to variability in the quality of and access to health care. Previous studies found that black patients are less likely to undergo evaluations for bladder cancer such as imaging, cystoscopy, and urology referral.[17] Even when diagnosed, black patients receive surgical treatment from less experienced surgeons at lower-volume facilities.[18] Black patients are also less likely to receive specific treatments such as radical cystectomy or definitive radiotherapy.[19–21] Moreover, African American patients may intrinsically be at higher risk for certain aggressive cancer subtypes.[22] Patients with Medicaid experience similar disparities in the care they receive for bladder cancer, as they are less likely than patients with private insurance to receive standard-of-care treatment.[23–25] Similarly, a New Jersey–specific investigation found that uninsured and Medicaid-insured status were associated with a significantly increased risk of death at 5 years compared to those with private insurance.[26]

Regarding the etiology of poorer bladder cancer survival outcomes for patients of lower SES, these patients often must travel greater distances in order to reach a health care facility capable of providing complex urologic surgery.[27] These lower-SES patients also have decreased access to regular medical care and may undergo substandard surgical operations when performed.[28] Patients from neighborhoods of lowest SES are half as likely to receive chemotherapy as patients from neighborhoods with the highest SES, which contributes to higher mortality for these patients.[29]

We found that Medicaid insurance status was an independent predictor of lower DSS. In light of the fact that uninsured patients or those with Medicaid are less likely to receive cystectomy or definitive radiotherapy or chemotherapy,[21] these patients likely do not receive appropriate and aggressive therapy, which contributes to their poorer survival outcomes. There is an obvious relationship between low SES and Medicaid insurance status. Data from the 2016 US Census Bureau showed that 42.5% of patients covered by Medicaid made less than $25,000 in total household income, and 71.1% made less than $50,000. There is also a higher percentage of black patients who use Medicaid and who have the lowest incomes. These differences are most dramatic when compared to white patients; Medicaid covers 29.4% of black patients compared to 17.3% of white patients. In 2017, the median-household income for black individuals was $40,258, and 32.6% of these households made less than $25,000 annually.[30] For white households, these numbers were $65,273 and 18.3%, respectively.

A variety of socioeconomic- and health-related factors appear to contribute to disparities in bladder cancer outcomes. A better understanding of sociodemographic factors and their influence on bladder cancer treatment equips policy makers, physicians, and patients with information regarding available and appropriate treatments for informed decision making. Furthermore, these findings define and quantify much of what is assumed and seen in clinical practice with regard to socioeconomic disparities in bladder cancer survival. While more work is needed in order to identify the sources of racial and socioeconomic disparities

in bladder cancer survival, possible solutions may include incentives for urologists to accept Medicaid insurance and to practice in underserved areas.

While this study identified clear differences in bladder cancer survival by SES, race, and insurance status, there were limitations associated with the use of a cancer registry. We were unable to adjust for risk factors associated with bladder cancer such as smoking status and occupational exposure, or differences in treatment such as chemotherapy or immunotherapy. A second limitation is that the CCR does not provide the duration of enrollment for Medicaid patients. This is notable because we could not distinguish between patients who were enrolled in Medicaid before diagnosis and those who enrolled after diagnosis, thus introducing the potential for length-time and spectrum bias. The registry also does not provide information about the length of time between time of diagnosis and enrollment in Medicaid, which makes our results subject to lead-time bias. This could explain why patients with no insurance fared better in terms of DSS than patients with Medicaid. Medicaid enrollment at a later stage of the disease process could have delayed treatment and resulted in poorer outcomes.

Conclusion

There is an association between race, insurance type, SES, and bladder cancer survival in California. Specifically, black race, Medicaid insurance, and lower SES are significantly associated with poorer 5-year DSS for bladder cancer. Disparities in survival are likely multifactorial, and may be influenced by social and financial barriers to optimal health care delivery.

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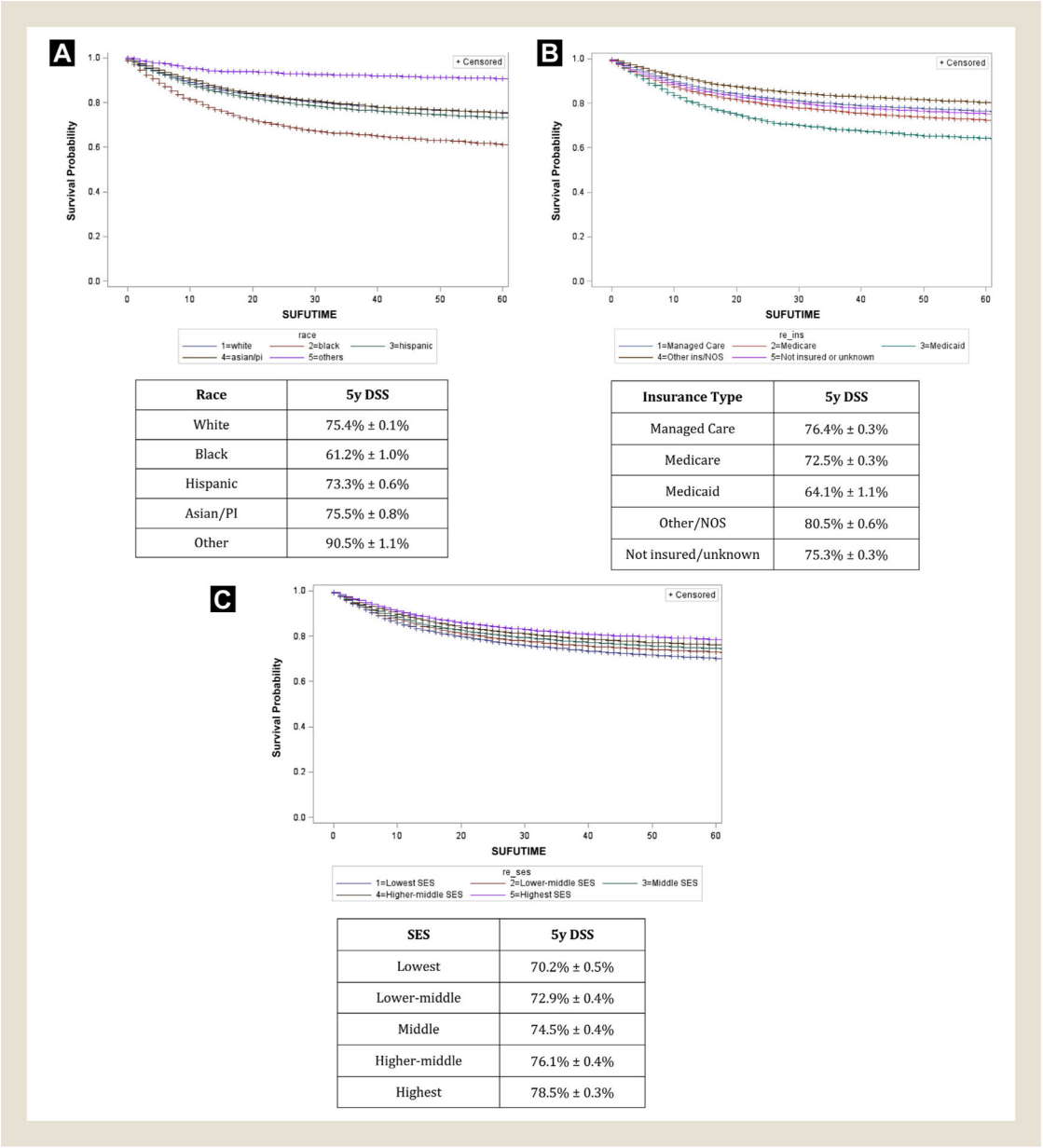
Clinical Practice Points

- Bladder cancer disparities in diagnosis and treatment have been characterized by sociodemographic factors including race, insurance type, and SES; however, insight regarding the role of these factors in relation to bladder cancer survival is limited. Specifically, survival outcomes stratified by insurance type and SES have not been extensively described for bladder cancer.
- Specific to the state of California, a state with a particularly diverse patient population with a robust mixture of minority populations, the association of SES and race with prostate, breast, colorectal, and lung cancer outcomes are well described. However, less is known regarding the influence of sociodemographic factors on bladder cancer outcomes.
- Our primary objective was to study the association of 5-year DSS for bladder cancer in California with race, insurance type, and SES.
- We found that black race, Medicaid insurance, and lowest SES portend a lower DSS, even after adjusting for classic clinical and pathologic features.
- Interestingly, we found that in California, patients with Medicaid insurance experience worse DSS than uninsured patients.
- Disparities in bladder cancer survival among black patients, patients with Medicaid insurance, and patients with a low SES are likely due to multiple broader-based socioeconomic and public health factors.
- More work is needed in order to identify the specific etiologies of racial and socioeconomic disparities in bladder cancer survival.
- Possible solutions may include incentives for urologists to accept Medicaid insurance and to practice in underserved areas.



Race	5y DSS
White	75.4% ± 0.1%
Black	61.2% ± 1.0%
Hispanic	73.3% ± 0.6%
Asian/PI	75.5% ± 0.8%
Other	90.5% ± 1.1%

Insurance Type	5y DSS
Managed Care	76.4% ± 0.3%
Medicare	72.5% ± 0.3%
Medicaid	64.1% ± 1.1%
Other/NOS	80.5% ± 0.6%
Not insured/unknown	75.3% ± 0.3%

SES	5y DSS
Lowest	70.2% ± 0.5%
Lower-middle	72.9% ± 0.4%
Middle	74.5% ± 0.4%
Higher-middle	76.1% ± 0.4%
Highest	78.5% ± 0.3%

Figure 1.

Kaplan-Meier Analysis Comparing Bladder Cancer Survival by Race, Insurance Type, and Socioeconomic Status. (A) Race ($P < .0001$), (B) insurance Type ($P < .0001$), and (C) Socioeconomic Status ($P < .0001$)

Table 1

Patient Demographics and Tumor Characteristics

Characteristic	Frequency (%)
Histologic Type	
Adenocarcinoma	587 (0.8)
Other	3845 (5.3)
Small-cell carcinoma	370 (0.5)
Squamous-cell carcinoma	1390 (1.9)
Urothelial carcinoma	66,260 (91.5)
Stage	
Localized	56,013 (77.3)
Regional	8605 (11.9)
Remote	4198 (5.8)
Unknown	3636 (5.0)
Grade	
I	7109 (9.8)
II	20,808 (28.7)
III	22,457 (31.0)
IV	15,548 (21.5)
Unknown	6530 (9.0)
Age	
18–49 years	4269 (5.9)
50–59 years	8800 (12.2)
60–69 years	18,091 (25.0)
70+ years	41,292 (57.0)
Sex	
Female	18,495 (25.5)
Male	53,957 (74.5)
Insurance	
Managed care	21,146 (29.2)
Medicare	22,011 (30.4)
Medicaid	2337 (3.2)
Other insurance/NOS	5306 (7.3)
Not insured or unknown	21,652 (29.9)
Socioeconomic status	
Lowest	91,58 (12.9)
Lower middle	13,635 (19.1)
Middle	15,746 (22.1)
Higher middle	16,347 (23.0)
Highest	16,334 (22.9)

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Characteristic	Frequency (%)
Race	
White	58,683 (81)
Black	2739 (3.8)
Hispanic	6352 (8.8)
Asian/Pacific Islander	3784 (5.2)
Other	894 (1.2)

Table 2

Frequencies of Demographics and Tumor Characteristics by Race

Parameter	Variable	White, N (%)	Black, N (%)	Hispanic, N (%)	Asian/Pacific Islander, N (%)	Other, N (%)	*P*
Age	18–49 y	3044 (5.2)	235 (8.5)	649 (10.2)	254 (6.7)	87 (9.7)	<.0001
	50–59 y	6827 (11.6)	430 (15.7)	935 (14.7)	462 (12.2)	146 (16.3)	
	60–69 y	14622 (24.9)	715 (26.1)	1644 (25.9)	894 (23.6)	216 (24.2)	
	70+ y	34190 (58.3)	1359 (49.6)	3124 (49.2)	2174 (57.4)	445 (49.8)	
Sex	Female	14559 (24.8)	1029 (37.6)	1721 (27.1)	946 (25.0)	240 (26.9)	<.0001
	Male	44124 (75.2)	1710 (62.4)	4631 (72.9)	2838 (75.0)	654 (73.1)	
Stage	Local	46024 (78.4)	1885 (68.8)	4648 (73.2)	2807 (74.2)	649 (72.6)	<.0001
	Regional	6843 (11.7)	435 (15.9)	799 (12.6)	494 (13.1)	34 (3.8)	
	Remote	3165 (5.4)	261 (9.5)	519 (8.2)	235 (6.2)	18 (2.0)	
	Unknown	2651 (4.5)	158 (5.8)	386 (6.1)	248 (6.6)	193 (21.6)	
Grade	I	5917 (10.1)	206 (7.5)	570 (9.0)	281 (7.4)	135 (15.1)	<.0001
	II	17150 (29.2)	662 (24.2)	1739 (27.4)	981 (25.9)	276 (30.9)	
	III	18316 (31.2)	925 (33.8)	1900 (29.9)	1167 (30.8)	149 (16.7)	
	IV	12255 (20.9)	686 (25.0)	1482 (23.3)	983 (26.0)	142 (15.9)	
	Unknown	5045 (8.6)	260 (9.5)	661 (10.4)	372 (9.8)	192 (21.5)	

Table 3

Frequencies of Demographics and Tumor Characteristics by Insurance Type

Parameter	Variable	Managed Care, N (%)	Medicare, N (%)	Medicaid, N (%)	Other Insurance/Not Otherwise Specified, N (%)	Not Insured/Unknown, N (%)	*P*
Age	18–49 y	1679 (7.9)	162 (0.7)	426 (18.2)	592 (11.2)	1410 (6.5)	<.0001
	50–59 y	3548 (16.8)	541 (2.5)	713 (30.5)	1381 (26.0)	2617 (12.1)	
	60–69 y	5454 (25.8)	4546 (20.7)	675 (28.9)	1629 (30.7)	5787 (26.7)	
	70+ y	10465 (49.5)	16762 (76.2)	523 (22.4)	1704 (32.1)	11838 (54.7)	
Sex	Female	5046 (23.8)	5927 (26.9)	642 (27.5)	1179 (22.2)	5701 (26.3)	<.0001
	Male	16100 (76.1)	16084 (73.1)	1695 (72.5)	4127 (77.8)	15951 (73.7)	
Stage	Local	16890 (79.9)	17172 (78.0)	1466 (62.7)	4202 (79.2)	16283 (75.2)	<.0001
	Regional	2513 (11.9)	2485 (11.3)	434 (18.6)	628 (11.8)	2545 (11.8)	
	Remote	1156 (5.5)	1303 (5.9)	312 (13.4)	269 (5.1)	1158 (5.3)	
	Unknown	587 (2.8)	1051 (4.8)	125 (5.3)	207 (3.9)	1666 (7.7)	
Grade	I	2024 (9.6)	1741 (7.9)	168 (7.2)	576 (10.9)	2600 (12.0)	<.0001
	II	5824 (27.5)	5771 (26.2)	582 (24.9)	1573 (29.6)	7058 (32.6)	
	III	6369 (30.1)	6521 (29.6)	658 (28.2)	1424 (26.8)	7485 (34.6)	
	IV	5301 (25.1)	5969 (27.1)	686 (29.4)	1277 (24.1)	2315 (10.7)	
	Unknown	1628 (7.7)	2009 (9.1)	243 (10.4)	456 (8.6)	2194 (10.1)	
Race	White	17243 (81.5)	17841 (81.1)	1256 (53.7)	4502 (84.8)	17841 (82.4)	<.0001
	Black	845 (4.0)	751 (3.4)	204 (8.7)	130 (2.5)	809 (3.7)	
	Hispanic	1877 (8.9)	1835 (8.3)	540 (23.1)	365 (6.9)	1735 (8.0)	
	Asian/Pacific Islander	989 (4.7)	1394 (6.3)	305 (13.1)	247 (4.7)	849 (3.9)	
	Other	192 (0.9)	190 (0.9)	32 (1.4)	62 (1.2)	418 (1.9)	
Socioeconomic status	Lowest	1996 (9.7)	2770 (12.9)	637 (28.0)	538 (10.3)	3217 (14.9)	<.0001
	Lower middle	3671 (17.8)	4101 (19.1)	556 (24.4)	904 (17.4)	4403 (20.4)	
	Middle	4644 (22.5)	4715 (21.9)	505 (22.2)	1140 (21.9)	4742 (22.0)	
	Higher middle	5237 (25.4)	4782 (22.2)	340 (14.9)	1225 (23.5)	4763 (22.1)	
	Highest	5091 (24.7)	5142 (23.9)	241 (10.6)	1401 (26.9)	4459 (20.7)	

Clin Genitourin Cancer. Author manuscript; available in PMC 2021 January 22.

Table 4

Frequencies of Demographics and Tumor Characteristics by Socioeconomic Status (SES)

Parameter	Variable	Lowest SES, N (%)	Lower Middle SES, N (%)	Middle SES, N (%)	Higher Middle SES, N (%)	Highest SES, N (%)	*P*
Age	18–49 y	582 (6.4)	801 (5.9)	883 (5.6)	990 (6.1)	964 (5.9)	<.0001
	50–59 y	1101 (12.0)	1548 (11.4)	1861 (11.8)	2032 (12.4)	2093 (12.8)	
	60–69 y	2299 (25.1)	3462 (25.4)	3836 (24.4)	4002 (24.5)	4203 (25.7)	
	70+ y	5176 (56.5)	7824 (57.4)	9166 (58.2)	9323 (57.0)	9074 (55.6)	
Sex	Female	2519 (27.5)	3613 (26.5)	4108 (26.1)	4129 (25.3)	3853 (23.6)	<.0001
	Male	6639 (72.5)	10022 (73.5)	11638 (73.9)	12218 (74.7)	12481 (76.4)	
Stage	Local	6682 (73.0)	10413 (76.4)	12223 (77.6)	12848 (78.6)	12971 (79.4)	<.0001
	Regional	1220 (13.3)	1609 (11.8)	1791 (11.4)	1901 (11.6)	1894 (11.6)	
	Remote	680 (7.4)	831 (6.1)	906 (5.8)	856 (5.2)	811 (5.0)	
	Unknown	576 (6.3)	782 (5.7)	826 (5.2)	742 (4.5)	658 (4.0)	
Grade	I	846 (9.2)	1351 (9.9)	1588 (10.1)	1612 (9.9)	1682 (10.3)	<.0001
	II	2563 (28.0)	3947 (28.9)	4558 (28.9)	4880 (29.9)	4711 (28.8)	
	III	2938 (32.1)	4257 (31.2)	4946 (31.4)	5032 (30.8)	4972 (30.4)	
	IV	1900 (20.7)	2854 (20.9)	3193 (20.3)	3436 (21.0)	3560 (21.8)	
	Unknown	911 (9.9)	1226 (9.0)	1461 (9.3)	1387 (8.5)	1409 (8.6)	

Table 5

DSS and OS by Disease Stage, Disease Grade, Age, Gender, Insurance Type, Socioeconomic Status, and Race

Parameter	Variable	DSS				OS			
		HR	HR 95% CI		*P*	HR	HR 95% CI		*P*
			Lower	Upper			Lower	Upper	
Stage	Local		Reference				Reference		
	Regional	3.095	2.981	3.213	<.0001	1.971	1.919	2.025	<.0001
	Remote	10.161	9.724	10.618	<.0001	6.604	6.374	6.842	<.0001
	Unknown	2.346	2.193	2.510	<.0001	1.560	1.496	1.626	<.0001
Grade	I		Reference				Reference		
	II	2.224	1.997	2.476	<.0001	1.141	1.102	1.181	<.0001
	III	6.240	5.627	6.921	<.0001	1.653	1.597	1.710	<.0001
	IV	6.789	6.111	7.542	<.0001	1.754	1.690	1.821	<.0001
	Unknown	5.051	4.513	5.654	<.0001	1.620	1.551	1.691	<.0001
Age	18–49 y		Reference				Reference		
	50–59 y	1.107	1.017	1.206	.0185	1.673	1.570	1.783	<.0001
	60–69 y	1.263	1.168	1.366	<.0001	2.670	2.518	2.831	<.0001
	70+ y	2.157	2.000	2.327	<.0001	5.945	5.614	5.296	<.0001
Sex	Male		Reference				Reference		
	Female	1.261	1.222	1.302	<.0001	1.009	0.989	1.029	.4049
Insurance	Managed care		Reference				Reference		
	Medicare	1.020	0.982	1.060	.3079	1.081	1.056	1.108	<.0001
	Medicaid	1.349	1.246	1.460	<.0001	1.533	1.449	1.623	<.0001
	Other insurance/not otherwise specified	0.934	0.875	0.998	.0432	0.970	0.930	1.011	.1488
	Not insured or unknown	1.012	0.973	1.053	.5373	1.129	1.102	1.156	<.0001
SES	Lowest	1.325	1.259	1.395	<.0001	1.429	1.385	1.474	<.0001
	Lower middle	1.276	1.219	1.336	<.0001	1.338	1.302	1.376	<.0001
	Middle	1.222	1.169	1.278	<.0001	1.263	1.230	1.297	<.0001
	Higher middle	1.118	1.069	1.169	<.0001	1.140	1.110	1.171	<.0001
	Highest		Reference				Reference		
Race	White		Reference				Reference		
	Black	1.295	1.212	1.384	<.0001	1.191	1.138	1.247	<.0001

Clin Genitourin Cancer. Author manuscript; available in PMC 2021 January 22.

Parameter	Variable	DSS				OS			
		HR	HR 95% CI		P	HR	HR 95% CI		P
			Lower	Upper			Lower	Upper	
	Hispanic	0.927	0.879	0.977	.0047	0.916	0.885	0.947	<.0001
	Asian/Pacific Islander	0.828	0.774	0.885	<.0001	0.736	0.705	0.769	<.0001
	Other	0.395	0.315	0.494	<.0001	0.598	0.539	0.663	<.0001

Abbreviations: CI = confidence interval; DSS = disease-specific survival; HR = hazard ratio; OS = overall survival.