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Current Clinical Presentation and Treatment of Localized Prostate Cancer in the United States

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Abstract

Purpose—The Surveillance, Epidemiology, and End Results (SEER) registry recently released Gleason score at the time of biopsy/TURP, which, for the first time, permits accurate assessment of the presentation and treatment of prostate cancer according to clinical factors at diagnosis.

Materials and Methods—The SEER database was used to identify men diagnosed with localized prostate cancer in 2010 who were assigned National Comprehensive Cancer Network (NCCN) risk based on clinical factors. We identified sociodemographic factors associated with having high-risk disease and analyzed the impact of these factors, along with NCCN risk, on local treatment.

Results—42,403 men were identified. 38% had low-risk, 40% had intermediate-risk, and 22% had high-risk disease. In multivariable analysis, patients who were older, non-White, non-married, or living in counties with higher poverty rates were more likely to be diagnosed with high-risk disease (all $p < 0.05$). Of the 38,634 men for whom prostate cancer was the first malignancy, 23% had no local treatment, 40% had prostatectomy, 36% had radiation treatment, and 1% had local tumor destruction (predominantly cryotherapy). In multivariable analysis, patients who were older, black, non-married, living in counties with higher poverty rates, or with low-risk disease were less likely to receive local treatment (all $p < 0.05$).

Conclusions—Our analysis provides information regarding the current clinical presentation and treatment of localized prostate cancer in the US. We found that nonwhite, older men, living in counties with higher poverty were more likely to be diagnosed with high-risk disease and less likely to receive local treatment.

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Keywords

Prostate cancer; Gleason score; Prostate specific antigen; Healthcare disparities

Introduction

The introduction of prostate specific antigen (PSA) screening over the last several decades has resulted in an increased incidence of prostate cancer, such that it is now the leading cancer diagnosis among men in the United States (US)[1]. Moreover, PSA screening has impacted the clinical presentation of prostate cancer, with patients now presenting with predominantly localized, low-risk disease[2–3]. Nonetheless, accurate information regarding the current risk profile of localized prostate cancer patients in the US is lacking. Previous studies that have reported on the risk profile of localized prostate cancer patients have suffered from an inadequate number of patients and/or insufficient information regarding clinical prognostic factors that are used to risk-stratify patients. An understanding of prostate cancer risk groups is important as these are used to guide pretreatment evaluations and management recommendations and also to predict the likelihood of recurrence after treatment.

This past year, the National Cancer Institute Surveillance, Epidemiology, and End Results (SEER) cancer registry released prostate cancer data which, for the first time, separately reports individual patient clinical Gleason score (GS) at the time of biopsy/TURP[4]. Although the SEER database has been capturing individual patient GS since 2004, prior to 2010, only pathologic GS (i.e. GS at the time of prostatectomy) was reported for patients undergoing surgery. Clinical GS, along with the previously available clinical (c) tumor (T)-stage and pre-biopsy/treatment Prostate Specific Antigen (PSA) level, is required to accurately risk-stratify patients based on clinical factors at presentation. As the SEER database captures information from approximately 28% of the US population, this allows a unique opportunity to study the risk strata at diagnosis across sociodemographic groups and treatment selection according to clinical factors at diagnosis. In this study, we present updated date on the current clinical presentation and treatment of localized prostate cancer in the US. We hypothesize that extent of disease and treatment varies across sociodemographic groups.

Methods

The SEER database [“SEER 18 Regs Research Data + Hurricane Katrina Impacted Louisiana Cases, Nov 2012 Sub (1973–2010 varying)”] was queried using SEER*Stat software, version 8.0.4 to identify men ages 20 years old and above diagnosed in 2010 with microscopically confirmed prostate adenocarcinoma (ICD-O-3 morphology code 8140). As all patient information in the SEER database is de-identified, this study was exempt from institutional review board evaluation.

Data on age at diagnosis, race, marital status, SEER registry, county poverty level (year 2000, the most recent available), clinical T-stage (from clinical extension coding), N-stage, M-stage, GS on needle core biopsy/TURP, and pre-biopsy/treatment PSA value was

extracted for all patients. Patients were classified as having localized (N0, M0), regional (N1, M0), or metastatic disease (M1) based on T-stage, N-stage, and M-stage at diagnosis. Those with localized prostate cancer were further categorized as low-(≤ cT2a, GS ≤ 6, and PSA < 10 ng/mL), intermediate-(cT2b-c, or GS 7, or PSA 10 – 20 ng/mL), or high-(≥ cT3, or GS ≥ 8, or PSA > 20 ng/mL) risk based on the National Comprehensive Cancer Network (NCCN) stratification scheme[1]. Patients with unknown T-stage, GS, or PSA were otherwise not risk stratified unless they had at least one high risk factor. Men with cT2 NOS were classified based on GS and PSA alone, a method shown to be reliable in a recent analysis[5]. Given the limited number of patients from Alaska and Rural Georgia, these were combined with those from Hawaii and Greater Georgia, respectively.

Among localized prostate cancer patients for whom prostate cancer was the first or only malignancy, we determined the type of local treatment received. Types of local treatment included no local treatment (with or without TURP), prostatectomy, external beam radiation, brachytherapy, combination external beam radiation and brachytherapy, radiation NOS, cryotherapy, high-intensity focused ultrasound, laser therapy, hyperthermia and other methods of local tumor destruction. The following categorizations of local treatment were used for the purposes of analysis: none (no local treatment with or without TURP), prostatectomy (with or without post-operative external beam radiation), radiation therapy (external beam radiation, brachytherapy, combination external beam radiation and brachytherapy, or radiation NOS), and local tumor destruction (cryotherapy, high-intensity focused ultrasound, laser therapy, hyperthermia, and other methods of local tumor destruction).

We calculated the proportion classified as having low, intermediate, and high NCCN risk as well as the proportion treated with no local treatment, prostatectomy, radiation therapy, and local tumor destruction according to the available patient demographic information. Chi-square analysis was performed to determine significant differences among groups of patients. We performed multivariate logistic regression analysis, including all available patient demographic information, to determine predictors of high-risk disease. Moreover, we performed multivariate logistic regression analysis, including all available patient demographic information along with NCCN risk category, to determine predictors of no local treatment (among all patients as well as subsets of patients according to NCCN risk). Sensitivity analyses were performed excluding patients classified as cT2 NOS and high risk patients with missing T-stage, GS, or PSA, to verify the conclusions of the multivariable analyses.

All statistical analyses were done at the 0.05 level of significance using SAS software version 9.3 (SAS Institute, Inc., Cary, NC).

Results

We identified 54,537 men diagnosed with prostate adenocarcinoma in 2010. Of these, 90% (48,978) had localized disease, 5% (2,655) had nodal or distant metastasis, while 5% (2,904) could not be classified. The characteristics of the 42,403 men (87% of those with localized disease) with sufficient information to be assigned NCCN risk are summarized in Table 1.

The remaining 13% (12,134) patients with localized disease had insufficient information to be assigned NCCN risk.

The median age at diagnosis was 65 years old; 69% (29,266) were white, 15% (6,291) were black, 8% (3,400) were Hispanic, 4% (1,884) were Asian/Pacific Islanders, and 0.3% (143) were Native American. In total, 38% (16,171) had low-risk, 40% (16,990) had intermediate-risk, and 22% (9,242) had high-risk disease. There was significant variation in NCCN risk by patient age, race/ethnicity, marital status, county poverty level and SEER registry (all $p < 0.0001$). Of note, 66% had non-palpable (cT1) disease, including 50% of men with high-risk disease. Of the 7,882 patients who were classified as cT2 NOS, 35% (2,721) had low-risk, 38% (2,982) had intermediate-risk, and 28% (2,179) had high-risk disease. Additionally, 9% (873) of the high-risk patients had missing T-stage, GS, or PSA. Risk group classification was driven primarily by GS; 84% of men with intermediate-risk disease had a GS of 7 and 71% of men with high-risk disease had a GS of 8–10. Of note, with use of pathologic instead of clinical GS in men undergoing prostatectomy, 7% of all patients would have an increase in NCCN risk and 3% would have a decrease in NCCN risk.

As shown in Figure 1, the incidence of high-risk disease varied according to race/ethnicity, with those of non-White race/ethnicity at greatest risk for high-risk disease. High-risk disease also increased with patient age, with a tripling of high-risk disease among those 75 years and older as compared to those less than 55 years old.

Multivariable analysis confirmed that older age, non-White race/ethnicity, non-married status, living in a county with a higher poverty level, and geographic location were independent predictors of high-risk disease (Table 2).

Altogether, 39,154 men did not have a history of prior malignancy. The characteristics of the 38,634 men (99%) for whom local treatment could be determined are summarized in Table 3. In total, 23% (8,832) received no local treatment, 40% (15,421) received prostatectomy, 36% (13,855) received radiation therapy, and 1% received local tumor destruction. Of those that received prostatectomy, 5% (694) received immediate post-operative external beam radiation. Of those that received radiation therapy as primary treatment, the majority (68%) received external beam radiation, while 20% received brachytherapy and 11% received combination external beam radiation and brachytherapy. Cryotherapy represented the majority (63%) of patients who underwent local tumor destruction. There was significant variation in local treatment by patient age, race/ethnicity, marital status, county poverty level, SEER registry, and NCCN risk category (all $p < 0.0001$).

As shown in Figure 2, local treatment varied by race/ethnicity, with Whites most likely to undergo prostatectomy and blacks most likely to undergo radiation treatment. Moreover, the proportion of patients treated with prostatectomy declined with age whereas all other local treatment options increased with age.

Finally, the proportion of patients receiving radiation treatment increased with NCCN risk and, interestingly, more intermediate risk patients received local treatment than those with high NCCN risk. As compared to high-risk patients who received treatment, those that did not receive treatment were older (median age 74 versus 67; $p < 0.0001$) and less likely to

be white (58% versus 67%; $p < 0.0001$). Moreover, high-risk patients who did not receive treatment were less likely to have palpable disease on exam.

Multivariable analysis of all patients confirmed that older age, black race/ethnicity, non-married status, living in a county with a higher poverty level, geographic location and low NCCN risk were independent predictors of the lack of local treatment (Table 4). On subset analysis, age, race/ethnicity, marital status, and geographic location remained independent predictors of the lack of local treatment among the low, intermediate, and high-risk cohorts, although county poverty level did not reach statistical significance.

Discussion

Our analysis provides information regarding the clinical presentation and treatment of localized prostate adenocarcinoma among a contemporary population which is representative of the US as a whole. We found that the majority of patients present with low to intermediate-risk disease, although there was significant variation by sociodemographic factors. Specifically, patients who were older, non-White, nonmarried, living in counties with higher poverty rates were more likely to be diagnosed with high-risk disease. Similarly, age, race/ethnicity, marital status, and county poverty rates—along with NCCN risk—were significant predictors of type of local treatment.

Although a number of previous studies have sought to describe the clinical presentation of prostate cancer in the current era, these included a limited number of patients and/or had limited information regarding important factors necessary for risk stratification[6–8]. The SEER database has grown to include more registries (and, therefore, patients) over time[4]. Moreover, the information provided for certain cancer diagnoses has evolved. For instance, SEER studies evaluating the presentation of prostate cancer prior to 2004 utilize the previously used WHO grading system[7]. The most recent and comprehensive SEER analysis that looks at the presentation of prostate cancer evaluated men diagnosed between 2004 and 2005[6]. During that time period, however, the SEER database recorded only a single GS from the largest tumor specimen available, which was the prostatectomy rather than biopsy specimen for those who underwent prostatectomy. Given the high rates of up- and down-grading of GS from biopsy to prostatectomy[9], determination of risk stratification based on data extracted from the SEER database during that era would not reflect disease at diagnosis for a considerable number of patients. Our analysis, on the other hand, utilizes SEER data which includes individual patient GS at the time of biopsy/TURP and can, therefore, more accurately risk stratify patients based on clinical presentation. In our study, 10% of all patients would have a change in NCCN risk with use of pathologic instead of clinical GS. Moreover, our analysis reflects a more contemporary Gleason grading, as these men were diagnosed after the 2005 International Society of Urological Pathology Consensus Conference on Gleason Grading, which resulted in a more homogeneous definition of Gleason 6 cancer and a greater proportion of Gleason 7 and higher disease than in the past[10]. Finally, although the analysis by Shao et. al. did describe the risk profiles of white and black patients according to various age groupings, they did not provide an overall estimate of the proportion of patients presenting with low-, intermediate-, and high-risk disease, nor did

they include patients of Hispanic or Asian/Pacific Islander race/ethnicity, which are growing segments of the US population.

Nonetheless, our findings of variation in NCCN risk according to sociodemographic factors are in line with other studies. The study by Shao et. al., for instance, also noted higher PSA levels, Gleason score, as well as overall AJCC risk with increased age and black, as opposed to white, race[6]. Using the CaPSURE (Cancer of the Prostate Strategic Urologic Research Endeavor) registry, which is a database capturing more than 14,300 men with prostate cancer enrolled at community, academic and VA hospitals since 1995, Dall'Era et. al. also demonstrated that older, non-White men are more likely to present with intermediate to high risk disease[8]. Additionally, they found that patients with lower levels of education, not in a significant relationship, or who lacked private/Veteran's Affairs insurance were more likely to have intermediate and high risk disease.

The clinical presentation of prostate cancer has changed dramatically over the last several decades as a result of PSA screening, with a larger proportion of men presenting with localized and low-risk disease[2,3,6,7]. The men in our study were diagnosed in 2010, after the 2008 US Preventive Services Task Force (USPSTF) recommendation against PSA screening for men age 75 and older but before the 2011 USPSTF recommendation against PSA screening for men of any age[11]. Interestingly, most men diagnosed with localized prostate cancer in 2010 had no disease palpable on digital rectal examination, indicating that they likely would not have been diagnosed with cancer if PSA screening had not been performed. Although PSA screening has recently come under increased scrutiny, it is unknown how and to what degree the clinical presentation of prostate cancer might change as PSA screening is expected to continue at least to some extent[12]. Our analysis illustrates the variation in NCCN risk across patient groups. The likelihood of high-risk disease based on a patient's age and race/ethnicity should be considered when weighing the potential risks and benefits of PSA screening.

Our analysis also provides information regarding the contemporary local treatment of prostate cancer. Although others have also demonstrated differences in local treatment according to patient demographics and geography[8,13–20], our study is unique in that we were able to demonstrate the variability in local treatment according to NCCN risk determined at clinical presentation. We noted an increase in the utilization of radiation treatment with NCCN risk. This is consistent with the general preference to avoid multi-modal local treatment, with its associated increased toxicities, among prostate cancer patients. Although it is intuitive that low-risk patients were most likely not to receive local treatment, as these patients are often best suited for active surveillance, interestingly, we found that intermediate-risk patients were more likely to receive local treatment than high-risk patients. Of note, there are now at least two randomized trials which have demonstrated a survival benefit to the addition of radiation treatment to androgen deprivation therapy in the setting of high-risk prostate cancer[21–22]. This cohort of patients was diagnosed after the publication of the first[21] but before the publication of the second[22]. Further follow-up will be required to determine if the proportion of high-risk patients receiving local treatment increases as a result of these publications.

Our analysis was, nonetheless, limited by the information available in the SEER database. For one, the SEER database does not capture individual patient income statistics and, as such, we utilized county-level poverty rates as a surrogate in our analyses. With regard to presentation, there is insufficient information regarding the utilization of PSA screening. A lack of screening may, at least to some degree, explain the disparities in presentation with high-risk disease by race[23]. With regard to treatment, although the SEER database captures type of local treatment, it does not capture some valuable information regarding those who receive no local treatment. Specifically, information regarding the administration of systemic therapy is not captured and, therefore, it is unknown how many patients without local treatment received androgen deprivation therapy alone. Similarly, the SEER database does not capture information regarding the reason why local treatment was withheld. There is a spectrum of men receiving no local treatment, including those who are healthy and elect to undergo active surveillance and those who are older and/or less healthy for whom the benefits of local treatment are not thought to outweigh its risks. As the SEER database does not capture information regarding comorbidities or performance status, we were unable to include these in our analysis. Finally, the decreased proportion of high-risk patients receiving local treatment may be the result of underascertainment of radiation delivery in the SEER database. Whereas there is some controversy regarding the addition of androgen deprivation therapy to external beam radiation in the setting of intermediate-risk prostate cancer, the utilization of androgen deprivation therapy is well-established for high-risk prostate cancer. The administration of neoadjuvant androgen deprivation therapy for high-risk patients may have led to some being misclassified as having received no local treatment due to a delay (and, therefore, inability to capture) in delivery of radiation treatment.

Conclusions

In conclusion, our analysis describes the contemporary clinical presentation and local treatment of prostate cancer in the US. We found that the majority of patients presented with low to intermediate-risk disease and that local treatment varied according to risk stratification. We, moreover, note persistent disparities in the presentation and treatment of prostate cancer according to sociodemographic factors.

Key of definitions

SEER	Surveillance Epidemiology and End Results
NCCN	National Comprehensive Cancer Network
PSA	Prostate specific antigen
US	United States
GS	Gleason score
TURP	Trans-urethral resection of the prostate
NOS	Not otherwise specified

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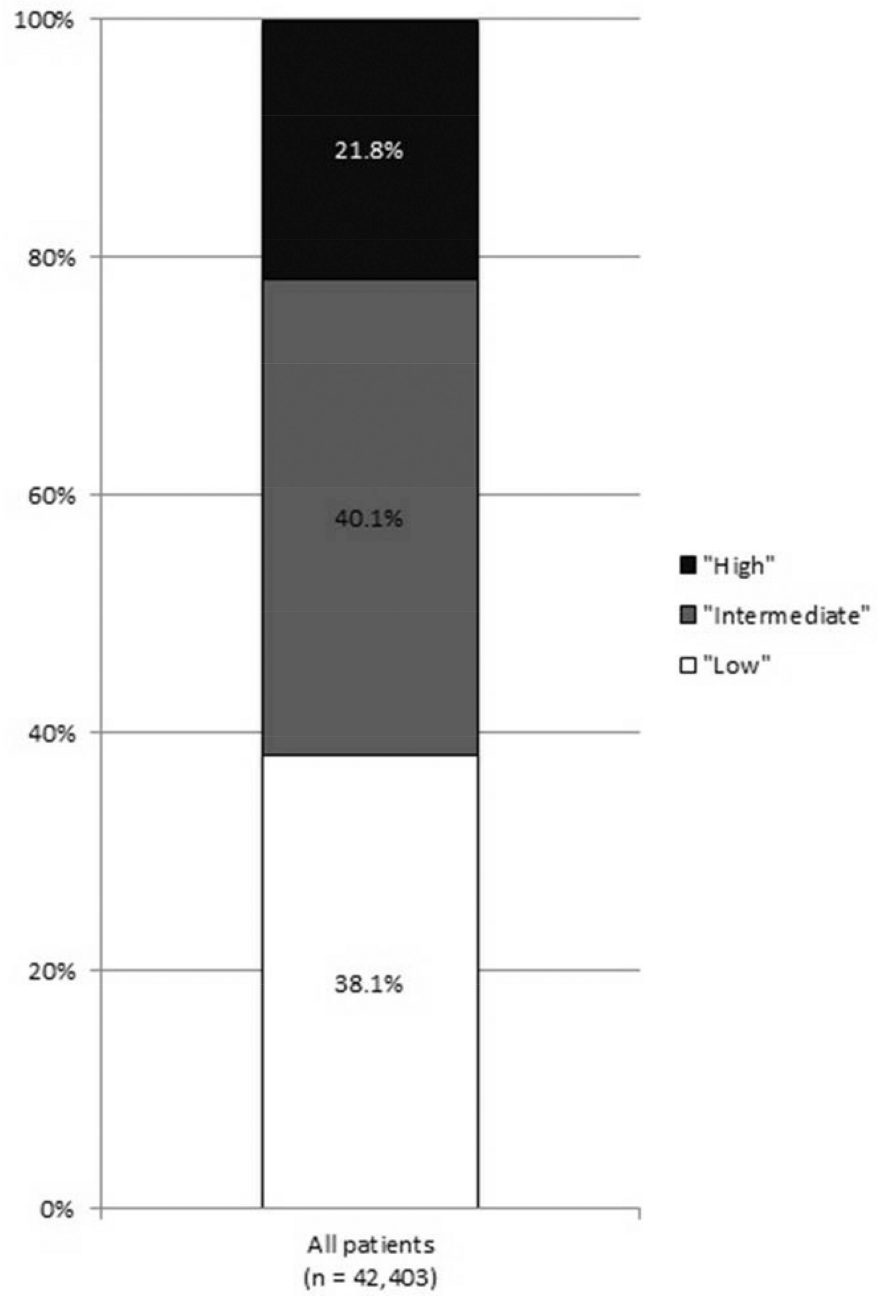
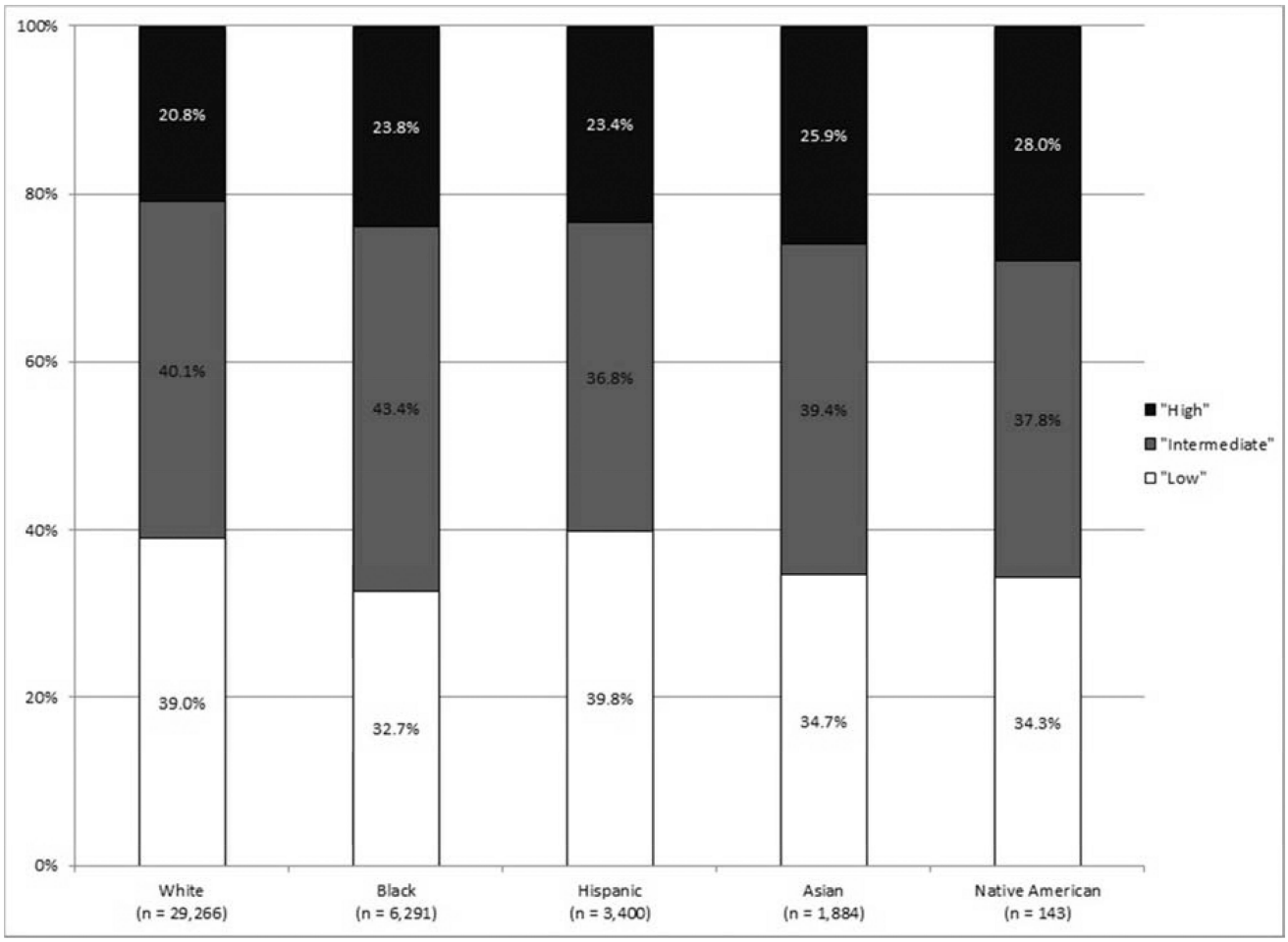




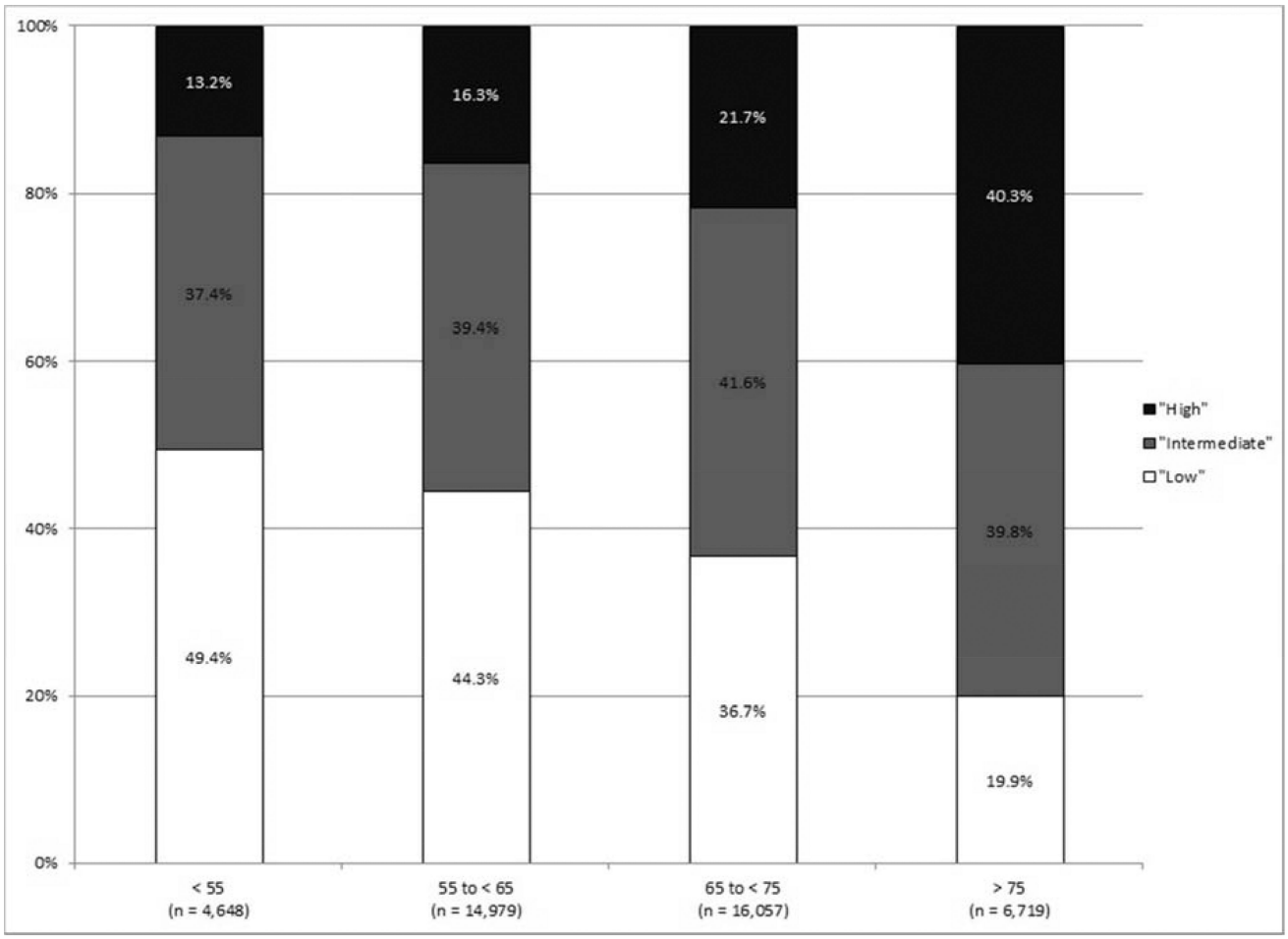
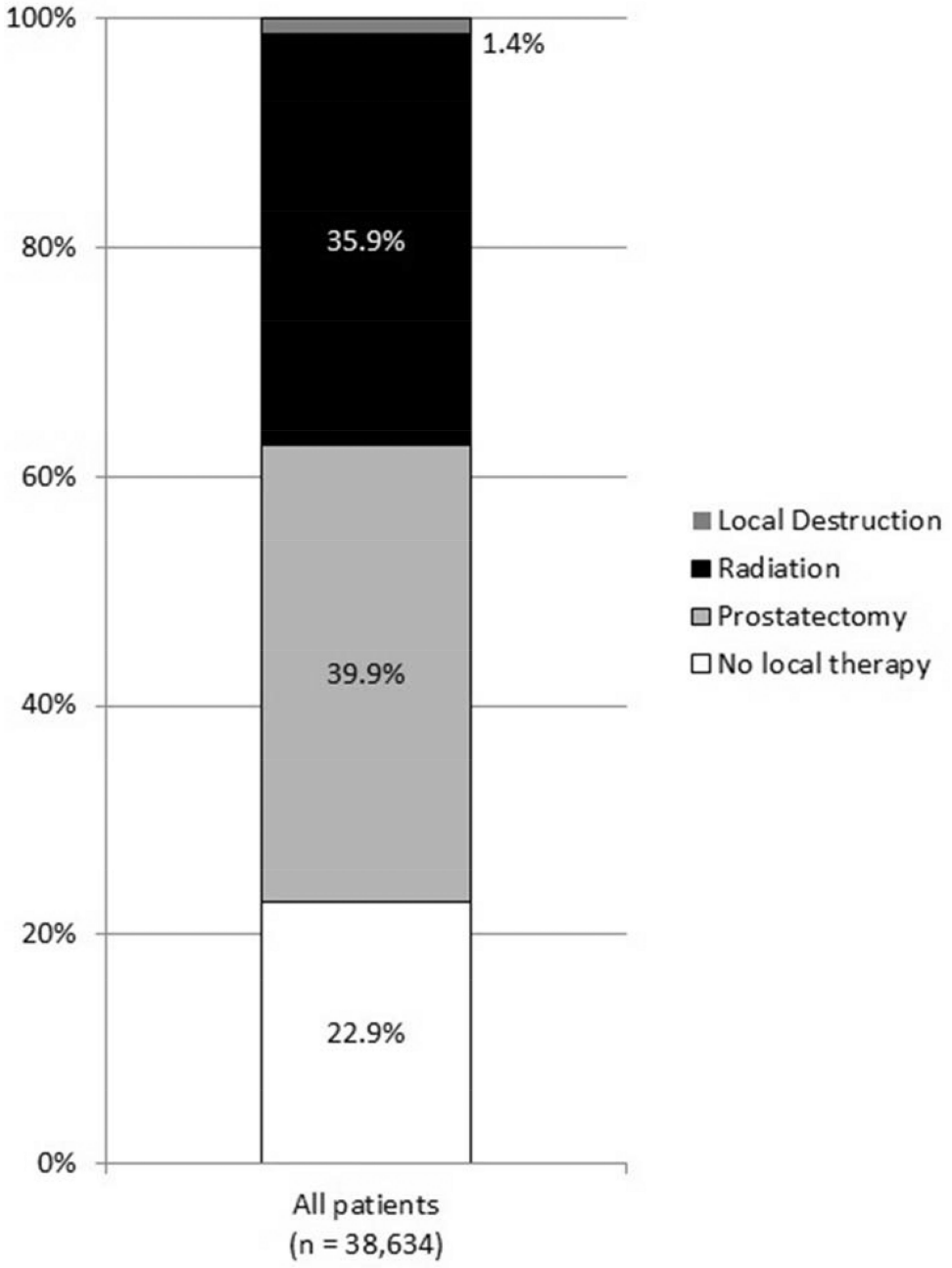
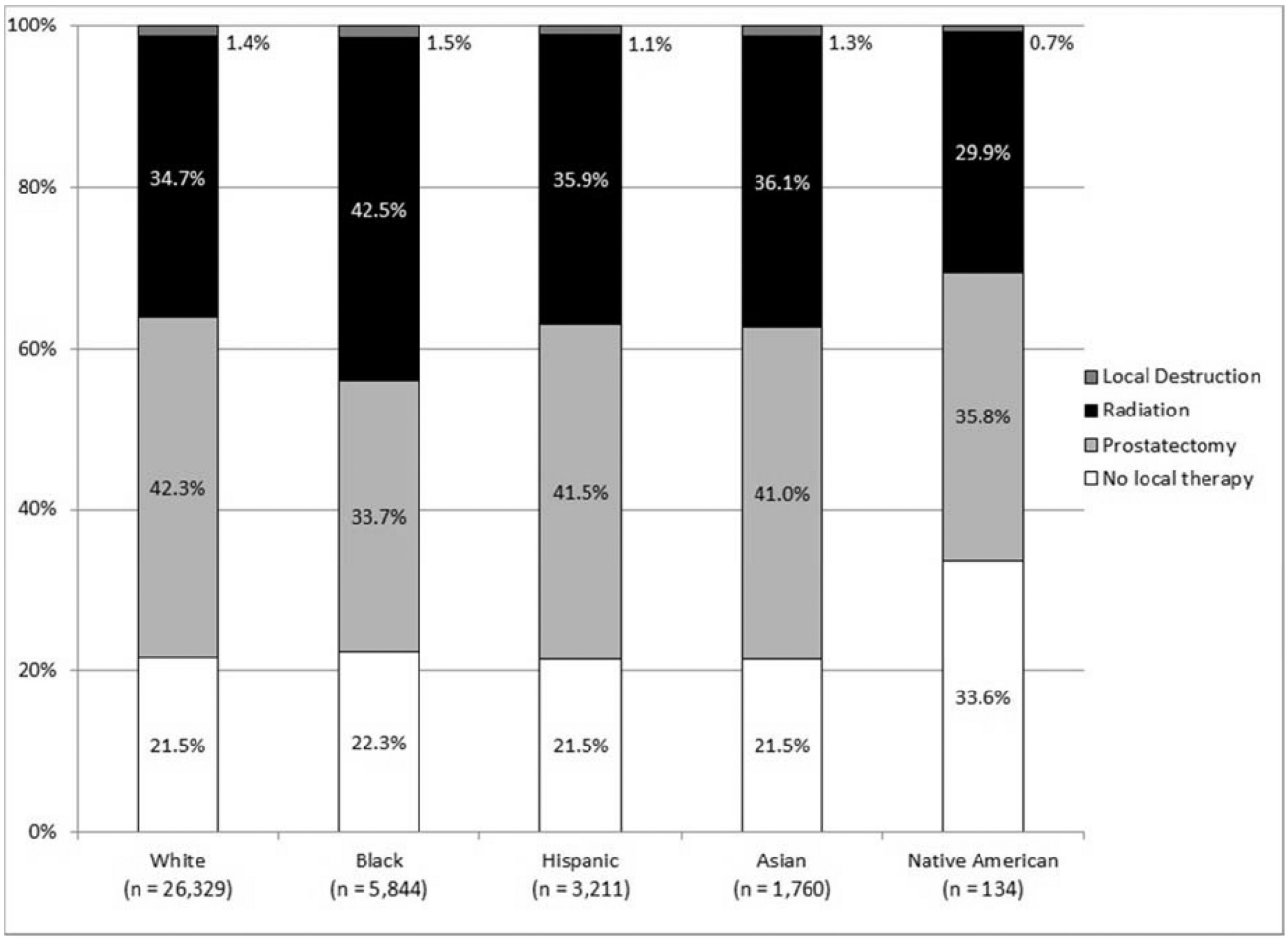
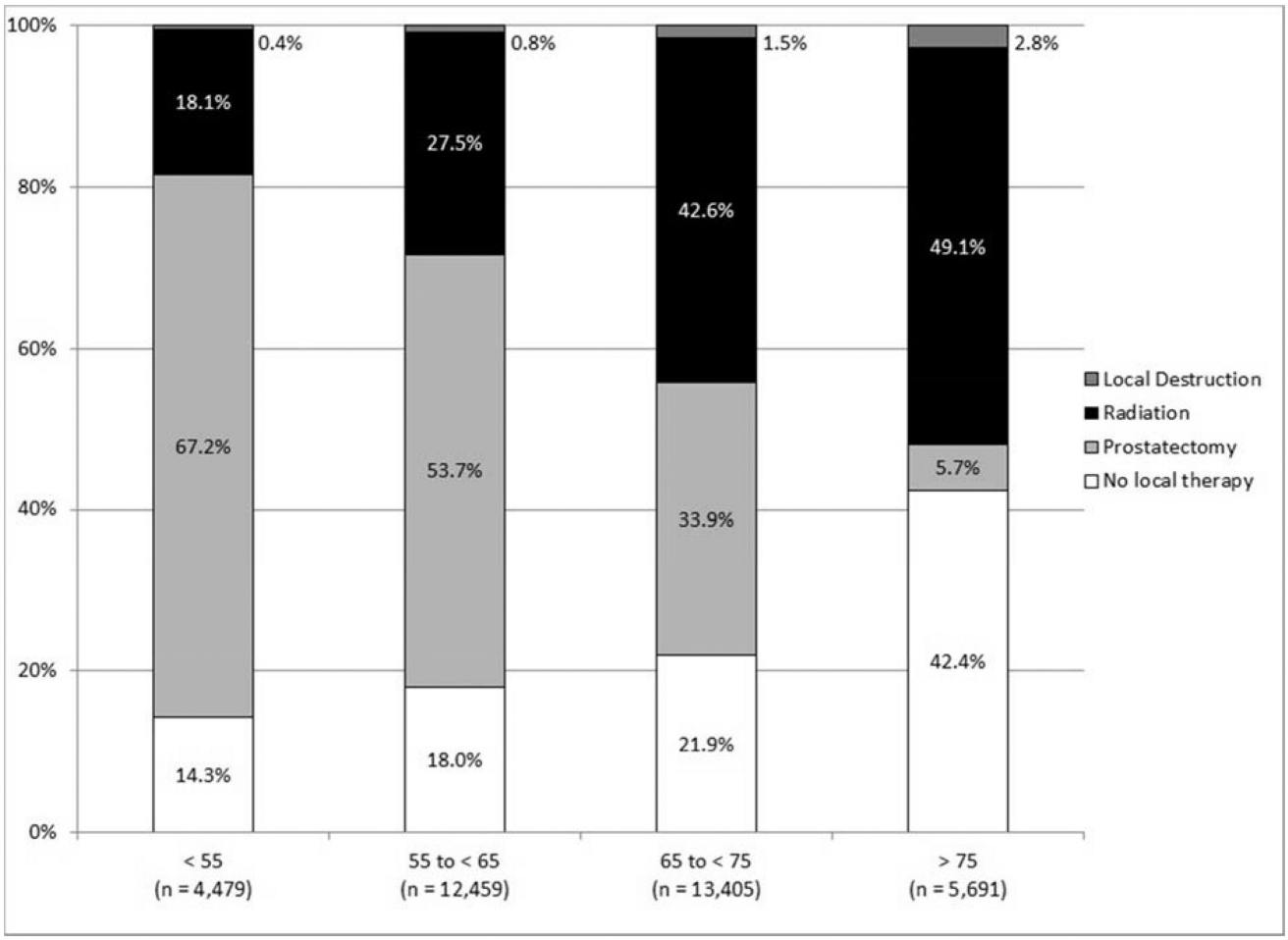


Figure 1.

NCCN risk stratification (A) for all patients, (B) by race/ethnicity, and (C) by age (all $p < 0.001$).







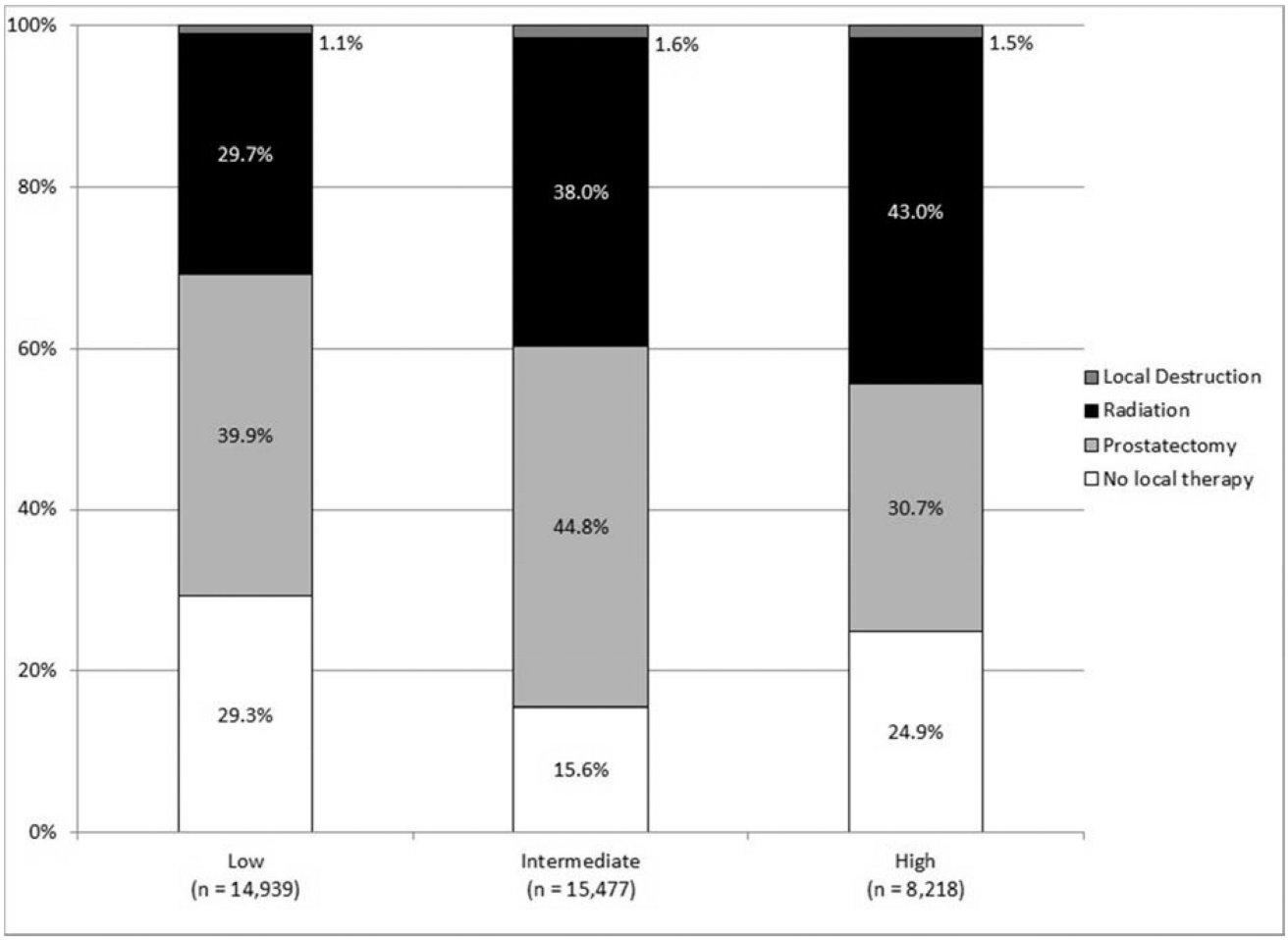


Figure 2.

Local treatment (A) for all patients, (B) by race/ethnicity, (C) by age, and (D) by NCCN risk (all $p < 0.001$).

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Table 1

Patient and tumor characteristics of 42,403 men with localized prostate cancer stratified by risk group.

	Low-Risk (n=16,171; 39.0%)		Intermediate -Risk (n=16,990; 40.1%)		High-Risk (n = 9,242; 20.8%)		p-value[#]
Age							< 0.001
Median	63		66		69		
Range	34–103		33–96		36–98		
Race							< 0.001
White	11424	70.6%	11746	69.1%	6096	66.0%	
Black	2059	12.7%	2732	16.1%	1500	16.2%	
Hispanic	1354	8.4%	1251	7.4%	795	8.6%	
Asian/Pacific Islander	653	4.0%	743	4.4%	488	5.3%	
Native American	49	0.3%	54	0.3%	40	0.4%	
Other/Unknown	632	3.9%	464	2.7%	323	3.5%	
Marital status							< 0.001
Married	11115	39.0%	11530	67.9%	5821	63.0%	
Not married	3043	33.9%	3690	21.7%	2252	24.4%	
Unknown	2013	40.7%	1770	10.4%	1169	12.6%	
County poverty rate							< 0.001
Highest rate quartile	3835	23.7%	4177	24.6%	2409	26.1%	
3rd quartile	3984	24.6%	4014	23.6%	2351	25.4%	
2nd quartile	4159	25.7%	4313	25.4%	2316	25.1%	
Lowest rate quartile	4191	25.9%	4484	26.4%	2160	23.4%	
Unknown	2	0.0%	2	0.0%	6	0.0%	
SEER Registry							< 0.001
SF/Oakland	982	6.1%	890	5.2%	503	5.4%	
Connecticut	738	4.6%	817	4.8%	452	4.9%	
Detroit	924	5.7%	1332	7.8%	524	5.7%	
Hawaii/Alaska	183	1.1%	224	1.3%	143	1.5%	

	Low-Risk (n=16,171; 39.0%)		Intermediate -Risk (n=16,990; 40.1%)		High-Risk (n = 9,242; 20.8%)		p-value[#]
Iowa	489	3.0%	709	4.2%	404	4.4%	
New Mexico	363	2.2%	392	2.3%	246	2.7%	
Seattle	955	5.9%	1059	6.2%	537	5.8%	
Utah	547	3.4%	541	3.2%	240	2.6%	
Atlanta	600	3.7%	727	4.3%	302	3.3%	
San Jose-Monterey	617	3.8%	536	3.2%	287	3.1%	
Los Angeles	1337	8.3%	1291	7.6%	732	7.9%	
CA excluding SF/SJM/LA	3379	20.9%	3458	20.4%	1949	21.1%	
Kentucky	771	4.8%	755	4.4%	522	5.6%	
Louisiana	1072	6.6%	1080	6.4%	644	7.0%	
New Jersey	2041	12.6%	1786	10.5%	981	10.6%	
Greater/Rural Georgia	1173	7.3%	1393	8.2%	776	8.4%	
PSA							< 0.001
< 10	16171	100.0%	12326	72.5%	3462	37.5%	
10 to 20	0	0.0%	4664	27.5%	1436	15.5%	
> 20	0	0.0%	0	0.0%	3561	38.5%	
Unknown	0	0.0%	0	0.0%	783	8.5%	
Gleason score							< 0.001
2 to 6	16171	100.0%	2740	16.1%	913	9.9%	
7	0	0.0%	14250	83.9%	1689	18.3%	
8 to 10	0	0.0%	0	0.0%	6532	70.7%	
Unknown	0	0.0%	0	0.0%	108	1.2%	
T-stage							< 0.001
1	12615	78.0%	10977	64.6%	4594	49.7%	
2	3556	22.0%	6013	35.4%	3540	38.3%	
3	0	0.0%	0	0.0%	937	10.1%	
4	0	0.0%	0	0.0%	103	1.1%	
Unknown	0	0.0%	0	0.0%	68	0.7%	

[#]Comparison across risk groups. Chi-square statistic for categorical variables and t-test for continuous variables.

SEER = Surveillance, Epidemiology, and End Results; NCCN = National Comprehensive Cancer Network; SF = San Francisco; CA = California; SJM = San Jose-Monterey; LA = Los Angeles

Table 2

Sociodemographic factors associated with high-risk disease at presentation.

	% High-risk disease at presentation	Adjusted Odds Ratio (95% CI)	*p*-value[#]
Age at diagnosis (per year increase)		1.06 (1.06–1.07)	< 0.001
Race			
White	20.8%	[reference]	
Black	23.8%	1.42 (1.32–1.53)	< 0.001
Hispanic	23.4%	1.23 (1.12–1.34)	< 0.001
Asian/Pacific Islander	25.9%	1.35 (1.20–1.52)	< 0.001
Native American	28.0%	1.44 (0.99–2.11)	0.058
Other/Unknown	22.8%	1.09 (0.95–1.24)	0.232
Marital status			
Married	20.4%	[reference]	
Not married	25.1%	1.30 (1.22–1.37)	< 0.001
Unknown	23.6%	1.11 (1.03–1.20)	0.009
SEER Registry			
CA excluding SF/SJM/LA	21.2%	[reference]	
SF/Oakland	22.5%	0.95 (0.84–1.07)	0.373
Connecticut	18.8%	1.16 (1.02–1.32)	0.021
Detroit	26.0%	0.79 (0.70–0.89)	< 0.001
Hawaii/Alaska	25.2%	1.04 (0.83–1.29)	0.756
Iowa	24.6%	1.29 (1.13–1.48)	< 0.001
New Mexico	21.1%	1.09 (0.93–1.28)	0.278
Seattle	18.1%	1.06 (0.94–1.19)	0.364
Utah	18.5%	0.84 (0.72–0.98)	0.029
Atlanta	19.9%	0.86 (0.74–0.99)	0.031
San Jose-Monterey	21.8%	0.89 (0.76–1.03)	0.119
Los Angeles	22.2%	0.91 (0.81–1.02)	0.111
Kentucky	25.5%	1.32 (1.17–1.48)	< 0.001
Louisiana	23.0%	0.97 (0.87–1.09)	0.642
New Jersey	20.4%	0.95 (0.86–1.05)	0.295
Greater/Rural Georgia	23.2%	1.05 (0.95–1.17)	0.317
County poverty rate			
Lowest quartile	19.9%	[reference]	
2nd quartile	21.5%	1.02 (0.95–1.10)	0.616
3rd quartile	22.7%	1.07 (0.99–1.16)	0.093
Highest quartile	23.1%	1.13 (1.03–1.24)	0.01

[#]Multivariate logistic regression model n = 42,393; men with unknown county poverty level (n = 10) were excluded.

SEER = Surveillance, Epidemiology, and End Results; NCCN = National Comprehensive Cancer Network; SF = San Francisco; CA = California; SJM = San Jose-Monterey; LA = Los Angeles

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Table 3

Patient and tumor characteristics of 38,634 men with localized prostate cancer without primary malignancy stratified by type of local treatment.

	No local therapy (n=8,832; 22.9%)		**Prostatectomy (n=15,421; 39.9%)**		**Radiation Therapy (n = 13,855; 35.9%)**		**Local Destruction (n = 526; 1.4%)**		**p-value[#]**
Age									< 0.001
Median	65		61		68		70		
Range	33–103		33–90		37–99		43–93		
Race									< 0.001
White	5673	64.2%	11149	72.3%	9135	65.9%	372	70.7%	
Black	1304	14.8%	1969	12.8%	2483	17.9%	88	16.7%	
Hispanic	689	7.8%	1334	8.7%	1153	8.3%	35	6.7%	
Asian/Pacific Islander	379	4.3%	722	4.7%	636	4.6%	23	4.4%	
Native American	45	0.5%	48	0.3%	40	0.3%	1	0.2%	
Other/Unknown	742	8.4%	199	1.3%	408	2.9%	7	1.3%	
Marital status									< 0.001
Married	4593	52.0%	11735	76.1%	9242	66.7%	371	70.5%	
Not married	2050	23.2%	2787	18.1%	3242	23.4%	114	21.7%	
Unknown	2189	24.8%	899	5.8%	1371	9.9%	41	7.8%	
County poverty rate									< 0.001
Highest rate quartile	2209	25.0%	4027	26.1%	3269	23.6%	119	22.6%	
3rd quartile	2218	25.1%	3740	24.3%	3609	26.0%	152	28.9%	
2nd quartile	2331	26.4%	4022	26.1%	3149	22.7%	140	26.6%	
Lowest rate quartile	2071	23.4%	3630	23.5%	3825	27.6%	115	21.9%	
Unknown	3	0.0%	2	0.0%	3	0.0%	0	0.0%	
SEER Registry									< 0.001
SF/Oakland	681	7.7%	654	4.2%	804	5.8%	15	2.9%	
Connecticut	392	4.4%	800	5.2%	603	4.4%	5	1.0%	
Detroit	508	5.8%	970	6.3%	972	7.0%	97	18.4%	
Hawaii/Alaska	82	0.9%	222	1.4%	189	1.4%	11	2.1%	

	No local therapy (n=8,832; 22.9%)		Prostatectomy (n=15,421; 39.9%)		Radiation Therapy (n = 13,855; 35.9%)		Local Destruction (n = 526; 1.4%)		p-value[#]
Iowa	267	3.0%	665	4.3%	505	3.6%	13	2.5%	
New Mexico	308	3.5%	347	2.3%	277	2.0%	3	0.6%	
Seattle	631	7.1%	1000	6.5%	607	4.4%	50	9.5%	
Utah	359	4.1%	477	3.1%	363	2.6%	36	6.8%	
Atlanta	312	3.5%	416	2.7%	718	5.2%	28	5.3%	
San Jose-Monterey	328	3.7%	418	2.7%	570	4.1%	4	0.8%	
Los Angeles	611	6.9%	1715	11.1%	774	5.6%	8	1.5%	
CA excluding SF/SJM/LA	1862	21.1%	3435	22.3%	2550	18.4%	121	23.0%	
Kentucky	298	3.4%	877	5.7%	650	4.7%	21	4.0%	
Louisiana	672	7.6%	950	6.2%	902	6.5%	33	6.3%	
New Jersey	875	9.9%	1540	10.0%	1938	14.0%	36	6.8%	
Greater/Rural Georgia	646	7.3%	935	6.1%	1433	10.3%	45	8.6%	
NCCN Risk									< 0.001
Low	4379	49.6%	5964	38.7%	4437	32.0%	159	30.2%	
Intermediate	2407	27.3%	6396	41.5%	5887	42.5%	247	47.0%	
High	2046	23.2%	2521	16.3%	3531	25.5%	120	22.8%	

[#]Comparison across risk groups. Chi-square statistic for categorical variables and t-test for continuous variables

SEER = Surveillance, Epidemiology, and End Results; NCCN = National Comprehensive Cancer Network; SF = San Francisco; CA = California; SJM = San Jose-Monterey; LA = Los Angeles

Table 4

Sociodemographic and tumor factors associated with type of local treatment.

	% Receiving no local therapy	Adjusted Odds Ratio (95% CI)	*p*-value[#]
Age at diagnosis (per year increase)		1.07 (1.07–1.07)	< 0.001
Race			
White	21.5%	[reference]	
Black	22.3%	1.26 (1.16–1.36)	< 0.001
Hispanic	21.5%	0.96 (0.87–1.06)	0.416
Asian/Pacific Islander	21.5%	1.02 (0.89–1.16)	0.822
Native American	33.6%	1.62 (1.10–2.41)	0.016
Other/Unknown	54.7%	2.93 (2.58–3.32)	< 0.001
Marital status			
Married	17.7%	[reference]	
Not married	25.0%	1.67 (1.56–1.77)	< 0.001
Unknown	48.6%	3.97 (3.69–4.27)	< 0.001
SEER Registry			
CA excluding SF/SJM/LA	23.4%	[reference]	
SF/Oakland	31.6%	1.50 (1.33–1.69)	< 0.001
Connecticut	21.8%	1.15 (1.00–1.32)	0.049
Detroit	19.9%	0.86 (0.75–0.98)	0.02
Hawaii/Alaska	16.3%	0.61 (0.47–0.81)	< 0.001
Iowa	18.4%	0.85 (0.73–1.00)	0.044
New Mexico	32.9%	1.50 (1.28–1.77)	< 0.001
Seattle	27.6%	1.39 (1.23–1.57)	< 0.001
Utah	29.1%	1.23 (1.05–1.43)	0.009
Atlanta	21.2%	0.98 (0.84–1.14)	0.775
San Jose-Monterey	24.8%	1.11 (0.95–1.29)	0.196
Los Angeles	19.7%	0.81 (0.71–0.92)	< 0.001
Kentucky	16.1%	0.69 (0.60–0.80)	< 0.001
Louisiana	26.3%	1.28 (1.14–1.44)	< 0.001
New Jersey	19.9%	0.72 (0.65–0.80)	< 0.001
Greater/Rural Georgia	21.1%	0.89 (0.79–0.99)	0.036
County poverty rate			
Lowest quartile	21.5%	[reference]	
2nd quartile	24.2%	1.09 (1.00–1.18)	0.046
3rd quartile	22.8%	1.01 (0.93–1.11)	0.758
Highest quartile	23.0%	1.15 (1.04–1.28)	0.006
NCCN Risk			
Low	29.3%	[reference]	

	% Receiving no local therapy	Adjusted Odds Ratio (95% CI)	*p*-value[#]
Intermediate	15.6%	0.35 (0.33–0.37)	< 0.001
High	24.9%	0.51 (0.47–0.54)	< 0.001

[#]Multivariate logistic regression model n = 38,626; men with unknown county poverty level (n = 8) were excluded.

SEER = Surveillance, Epidemiology, and End Results; NCCN = National Comprehensive Cancer Network; SF = San Francisco; CA = California; SJM = San Jose-Monterey; LA = Los Angeles