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Association of Age on Diagnosis and Treatment of Locally Advanced and Metastatic Prostate Cancer

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Year of 2019

M.P.H. degree

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Abstract

Background Prostate cancer is an aging-related disease. As the result of the radiation are of STAMPEDE trial came out, major shifts in the use of local therapy (LT) are expected for men newly diagnosed with locally advanced and metastatic disease. This study aims to determine the role of patient age on LT.

Methods We identified 6882 and 37382 locally advanced and metastatic prostate cancer diagnosed in 2004-2014 using the National Cancer Database (NCDB). We used logistic multivariable regression to determine the role of age in the receipt of prostate and/or pelvic radiation or radical prostatectomy after adjusting for demographic and clinical factors.

Results Among patients with locally advanced disease, 3,559 (52%) patients received definitive local therapy as their first course of therapy, including 2508 (36%) radiation and 1,323 (19%) radical prostatectomy (RP). Among patients newly diagnosed with M1 disease, 2371 (6.3%) patients received definitive local therapy. 1873 (5.0%) and 537 (1.4%) patients received radiation therapy and RP respectively. In the multivariable analysis (MVA), adjusted for clinical characteristics and demographics, compared with men age <50 years, the odds ratios for receiving local treatment were 0.36 (95% CI: 0.26-0.48) and 0.48 (95% CI: 0.37-0.60) for men ≥70 in locally advanced and metastatic disease respectively.

Conclusion We found that local therapy was undertaken in the majority of men with regional disease, and less common in the metastatic setting. Age was a major determinant of the receipt of any local therapy, as well as the selection of prostatectomy or radiation therapy.

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Introduction

By incidence and mortality prostate cancer is an aging-related disease[1]. Indeed, the median age at diagnosis and death from disease in the United States is 66 and 80 years, respectively.[2] The widespread integration of screening of men with prostate-specific antigen (PSA) has resulted in the detection of early-stage cancers in many individuals, and led to a reduction in prostate cancer mortality.[3,4] Nonetheless, prostate cancer remains the second-leading cause of cancer related death among men. Patients diagnosed at a localized stage experience nearly 100% 5-year survival, while the majority those diagnosed at advanced or metastatic stage will eventually succumb to the disease.[5,6] On this basis, efforts have been directed at both averting progression through local therapy, while developing increasingly efficacious treatments for advanced or metastatic disease. Within the past decade, systemic therapies including new generations of androgen receptor inhibitors[7], docetaxel-based chemotherapy [8], and bone targeting agents[9] have been shown to improve overall survival.

At the same time, there has been sustained interest for local therapy to the prostate in those with advanced or metastatic disease. Recently, the radiation arm of the STAMPEDE trial reported a survival benefit with prostate radiotherapy in the subset of patients with low-volume metastatic disease and has now been incorporated into major clinical practice guidelines including the National Comprehensive Cancer Network's (NCCN).[10] However, prior to this publication, level-one evidence has been lacking, and support for this practice has been offered by observational studies.[11-17] On this basis, radiation with androgen deprivation therapy (ADT) has been recommended as a preferred initial strategy for patients

with N1 disease with greater than 5 years of life expectancy or symptomatic disease. Yet, it is not known how commonly local therapy is given to patients with advanced disease, or which factors contribute to its selection.

As major shifts in practice are expected for men newly diagnosed with metastatic disease, there are reasons to study the role of patient age and local therapy. Age is consistently a major driver for treatment decisions in the localized setting, including the use of radical prostatectomy versus radiation therapy.[18-20] Young patients may be offered therapy seen as maximally aggressive due to fewer competing causes of death, and improved tolerability. Second, although a high level of evidence is now available to support local therapy with radiation for men with low-volume M1 disease, prostatectomy likely still remains in use, and it is not known how age or other factors affect. Therefore, we aimed to evaluate the role of age on the diagnosis and treatment of men with locally advanced and metastatic prostate cancer.

Materials and Methods

Data Source

We performed a retrospective study using registry data from the National Cancer Database (NCDB). The NCDB is a joint program of the Commission on Cancer (CoC) and the American Cancer Society, and is the largest oncology database in the United States, containing approximately 70% of cancer patients nationwide. NCDB contains patient-level demographic information such as race, age, and insurance status. Regional-level education and household

income information is available and is reported by U.S. postal zip code. The NCDB also contains details regarding disease characteristics (year of diagnosis, clinical stage, PSA at diagnosis, and biopsy Gleason score), the first course of treatment (e.g., radiotherapy and prostatectomy).[21]

Patient cohort

Men diagnosed with adenocarcinoma of the prostate (International Classification of diseases-O-3 code: C61.9) between 2004 and 2014 were included. Patients from before 2004 were not included because PSA and Gleason score were not routinely collected. We included patients with valid age, clinical T category, clinical M category and clinical N category (Nx was considered as unknown, but not missing) at diagnosis. Men with prior cancers were excluded as prior cancers can influence a patient's demographics and treatments. A patient exclusion schema is shown in the Supplemental Table. The final analytic cohort consisted of 1,066,298 patients.

Variables

We regarded age as both a continuous variable (per 1 year), and grouped as follows to reflect common clinical thresholds, including a stratification at age 70 years as used in the STAMPEDE study: ages<50 years, 50 to 70 years, and ≥70 years at the time of diagnosis. Cancer stage was defined as distant metastatic (M1) or regional metastatic (N1). Local therapy was defined as radical prostatectomy (RP), brachytherapy, and/or EBRT (RT) targeted to the

prostate as indicated by treatment recorded in the NCDB. Non-local therapy was defined as all the other treatment modalities including systemic therapy (ADT, active surveillance, and/or EBRT not targeted to the prostate). Other variables that were included in the analysis were clinical T stage (T1, T2, T3, and T4), clinical M stage (M0, M1), clinical N stage (N0/Nx, N1), biopsy Gleason Score (≤6, 7, ≥8), year of diagnosis (2004-2007, 2008-2011, 2012-2014), race/ethnicity (non-Hispanic white, non-Hispanic black, and other/unknown), high school education status, income status, insurance status, metropolitan status. The Charlson/Deyo Comorbidity Index (CCI) was categorized as 0, 1, and 2 per the NCDB participant user file. Facility characteristics included regions, types, and distance from facility.[22,23]

Statistical analysis

We compared differences in clinical and sociodemographic characteristics between age groups, categorical variables were compared with the chi-square test and continuous variables were compared with the Mann Whitney test. Among men diagnosed with prostate cancer, we first used logistic regression to determine the odds of advanced or metastatic disease by age groups, controlling for year of diagnosis, patient demographics, and facility characteristics. We further analyzed the likelihood of receiving any local treatment by age at diagnosis in lymph-node positive patients (clinical N1M0 stage) and distant metastatic patients (clinical M1 stage) respectively, controlling for clinical and demographic characteristics. All analyses were performed with SAS 9.4 (SAS Institute, Cary, NC, USA), with a p-value <0.05 considered significant.

Results

Descriptive characteristics of the study population stratified by age are shown in Table 1. Overall, 72% of patients were non-Hispanic white, and 96% had insurance coverage. Median age in the overall cohort was 65 years (Interquartile range: 58-71). Of these men, 39,355 (4%) were age <50 at the time of diagnosis, 720,573 (68%) were at age 50 to 70, and 306370 (29%) were older than 70 years. The median PSA value was 6.1 (IQR: 4.5-9.9), and most patients were diagnosed with lower Gleason grade cancers (41% Gleason <=3+3). A total of 45202 (4.2%) patients were diagnosed with metastatic disease (clinical M1 or N1 stage). These included, 38,120 (3.6%) were diagnosed with distant metastatic disease (M1), and 7082 (0.7%) were diagnosed with regional lymph-node metastasis (N1M0). Comparison of cancer characteristics by age group revealed higher PSA, Gleason score, and stage among patients aged ≥70 years at diagnosis (Table 1).

In the multivariable regression of diagnosis with metastatic prostate cancer, patients aged ≥70 had significantly greater odds (OR 2.13. 95% CI: 2.01-2.26) compared to patients aged <50. In addition, later year of diagnosis (2012-2014, OR: 2.33, 95%CI: 2.27-2.39) and 2008-2011 (OR: 1.39, 95%CI: 1.35-1.42) were more likely to be diagnosed with metastatic disease compared to their counterpart of 2004-2007. Patients without any insurance had a significantly higher odds of diagnosed with metastatic disease (OR: 4.27, 95%CI: 4.08-4.47) compared to who had any insurance. Shorter distance from the treatment facility was associated with higher odds of diagnosed with metastatic disease (nearest quintiles vs. farthest quintiles, OR: 1.85,

95%CI: 1.78-1.92).

To further analyze the association of age at diagnosis with treatment modalities in metastatic prostate cancer, 6882 and 37382 patients with regional lymph-node positive (N1M0) disease and distant metastatic (M1) disease with known treatment information were identified from the entire cohort. Descriptive characteristics of the study population stratified by age are shown in Table 3. Among patients diagnosed with N1 disease, 68% of patients were non-Hispanic white, and 93% had insurance coverage. Median age in the cohort was 65 (IQR: 59-72). Of these men, 252 (4%) were age <50 at the time of diagnosis, 4352 (63%) were at age 50 to 70, and 2278 (33%) were older than 70 years. The most frequent PSA value category was <20. In our cohort, 11% of patients were missing information on Gleason score, and the most frequent category was ≥8 (63%).

For distant metastatic cohort. 65% of patients were non-Hispanic white, and 92% had insurance coverage. Median age in the cohort was 70 (IQR: 61-79). Of these men, 1113 (4%) were age <50 at the time of diagnosis, 17308 (46%) were at age 50 to 70, and 18961 (33%) were older than 70 years. The most frequent PSA value category was >40. In our cohort, 31% of patients were missing information on Gleason score, and the most frequent category was ≥8 (54%).

Among patients with N1 disease, 3,559 (52%) patients received definitive local therapy as their first course of therapy, including 2508 (36%) radiation and 1,323 (19%) RP. We observed substantial variation in local therapy based on patients age (Fig 1); in general, older men were less likely to receive RP. The proportion of patients receiving RT remained steady before age

85 years but decreased significantly after patients ≥85 years. In the multivariable analysis (MVA), adjusted for clinical characteristics and demographics, compared with men age <50 years, the odds ratios for receiving local treatment were 0.36 (95% CI: 0.26-0.48), and 0.73(95% CI: 0.54-0.98) for men age ≥70 and 50-70 years, respectively. Patients diagnosed with clinical T3 stage had the highest likelihood of receiving LT (OR: 5.77, 95%CI: 3.99-8.33). Patients without any insurance had a significantly lower likelihood of receiving LT (OR: 0.55, 95%CI: 0.42-0.72) compared to who had any insurance. Men with higher PSA values, Gleason score, non-Hispanic Black race, and those residing in the northeast also had lower odds of local treatment.

Among patients newly diagnosed with M1 disease, 2371 (6.3%) patients received definitive local therapy. 1873 (5.0%) and 537 (1.4%) patients received radiation therapy and RP respectively. Unadjusted rates of local treatment were similar across all age categories (Fig 1). In the MVA, adjusted for clinical characteristics and demographics, men age ≥70 (OR:0.48, 0.37-0.60), men without any insurance (OR: 0.52, 95%CI: 0.41-0.66), were significantly less likely to receive LT compared with men age <50 years and men with any insurance coverage. Patients diagnosed with clinical T3 stage had the highest likelihood of receiving LT (OR: 2.43, 95%CI: 2.04-2.87). Men with higher PSA values, Gleason score, non-Hispanic Black race, higher comorbidities lever, and those residing in lower income area also had lower odds of local treatment.

Discussion

Using hospital registry data from the NCDB, we evaluated national practice patterns among patients with regional and distant metastatic prostate cancer. We found that local therapy was undertaken in the majority of men with regional disease, and less common in the metastatic setting. However, when controlling for disease characteristics, age was a major determinant of the receipt of any local therapy, as well as the selection of prostatectomy or radiation therapy. Patients older than 70 years had a two-fold lower odds of receiving local therapy. Patients without insurance, higher comorbidity level were less likely to receive LT. In light of the recent maturation of new level 1 evidence supporting a survival benefit for men with low-volume metastatic disease, we believe these findings can shed light on the practice pattern of local treatment among different groups and may inform efforts to refine patient selection and improve overall accessibility.

We found that the odds of LT were significantly lower in group older than 70. Multiple previous studies have similarly reported that older men were less likely to undergo the potentially curative treatments of RP or radiotherapy in localized settings.[20,24] Seth et al.[19] analyzed the treatment pattern among high risk prostate cancer using CaPSURE data. They reported the odds ratios for receiving local treatment were 0.21 (95% CI, 0.15 to 0.28), and 0.04 (95% CI, 0.03 to 0.06) for 66 to 75, and ≥75 years compared with men age ≤55 years adjusting for CAPRA score and year of treatment. However, despite the discrepancy of local therapy among older and younger patients, prior studies did not find a significant difference in outcomes. In the subgroup analysis of STAMPEDE trial, overall survival improvement of patients allocated radiotherapy was not significantly different between age <70 (HR 1.03,

95%CI 0.86-1.24) and age ≥70 (HR 0.78, 95%CI 0.63-0.98).[10] Chad et al.[12] reported similar results of their study analyzing the impact of LT in nodal disease using SEER data. In their study, the effect of radiotherapy on overall survival did not differ significantly between age<70 and ≥70 in cN+ cohort. While in pN+ cohort, despite a greater benefit of local therapy for patients aged <70 years was being observed, the OS benefit of local therapy remained significant for patients aged >=70 years (HR 0.63, 95% CI 0.50-0.78). Existing evidence cannot justify such a huge difference in treatment decision making in the current study.

Observational data in our study cannot fully control factors that influence decision making. Thus, there might be alternative explanations for the treatment discrepancy among age, including patient preference and metastatic volume. The age of the patient may affect treatment preferences. Older patients may be more risk averse and less willing to sacrifice quality of life for prolongation of life.[25] Also, the metastatic volume has been showing to be a vital determinant of outcome in several studies.[10,26] It would be reasonable to believe it also has a significant impact on treatment decision.

Despite no level 1 evidence, local prostate therapy was performed in a small but number of patients with metastatic disease. The increasing interest may be raised by the survival benefit being observed from other cancer entities when the primary tumor was surgically resected.[27,28] A biological basis to support such aggressive therapy may be related to the elimination of cytokine signaling, which may enhance metastatic seeding.[29,30] In recent years, retrospective data have been shown the association of radiotherapy with overall survival benefits.[12,17] However, the radiation arm of the STAMPEDE trial reported no improve overall survival for

unselected patients (HR 0.92, 95%CI 0·80–1.06) while it was improved in patients with low metastatic burden (HR 0·68, 95% CI 0·52–0·90).[10] The effectiveness of other forms of local treatment, such as RP, remains unproven. A recent study using NCDB report a survival benefit with mPCa and RP, 3-yr survival probability of 78% (95% CI 73–83%) for RP vs. 48% (95% CI 47–49%) for the non-local therapy group.[15] Another study using SEER reported similar 5-yr survival benefit (RP vs. NTL: 67.4% vs. 22.5%).[17] However, retrospective studies suffer from severe selection bias and may not be convincing enough. Patients who underwent local therapy could be highly selected. Even after multivariate analysis and propensity score matching, there may still exist unmeasured confounding factor, reducing the comparability between treatment groups. Development of new systemic therapies, such as docetaxel, abiraterone, enzalutamide, sipuleucel-T, cabazitaxel, and radium223, also provides physicians options other than LT. Prospective randomized clinical trials are needed to elucidate the use of local therapy in this setting.

We found that LT was omitted in almost half of patients with nodal disease despite recommendation that patients with symptomatic disease and reported survival benefit from multiple retrospective studies. A recent study using NCDB reported outcomes of propensity-matched node-positive patients treated with RT and ADT versus ADT alone.[31] RT was associated with a 50% reduction in risk of 5-year all-cause mortality (71.5% vs. 53.2%; $P < .001$). Another analysis using SEER database showed local therapy (RP and/or RT) improved 10-year overall survival (45% vs. 29%; $P < .001$) and cancer-specific survival (67% vs. 53%; $P < .001$) compared with no local therapy.[12] Published guidelines recommend either RT with

long-term androgen deprivation therapy (ADT) or long-term ADT alone in node-positive prostate cancer patients. However, our study finds that RT and RP are still uncommon treatment choices (36% and 19% of patients), despite promising results from retrospective series. High-level evidence from formal prospective trials is urgently needed to address the effectiveness of LT and the selection of optimal candidates.

Limitations

This study has certain limitations. First, only Commission on Cancer-accredited facilities contributed to the NCDB data collection; thus, the sample was not population-based. Second, because our dataset was limited to patients diagnosed between 2004 and 2014, more recent practice pattern could not be observed. Third, owing to the retrospective nature of the study, confounding factors may exist that were not accounted for. Forth, because detailed data regarding metastatic number and sites for patients were not available, this information could not be factored into treatment consideration. In addition, patient-related factors, such as patient motivation itself or social support of caregivers or spouses, and treatment-related factors, such as side-effect and toxicity are not captured by the NCDB, which may affect treatment decision. Finally, although we have data about comorbidity, we do not know patients' life expectancy or the presence of local symptoms which have an impact on treatment choice.

With the publication of the STAMPEDE-RT trial, radiation with systemic therapy is now recommended as first line treatment for patients with low-volume (less than or equal to 4 metastatic sites). Therefore, future opportunities to examine practice patterns in light of this

information will be informative. Newer imaging modalities are redefining how prostate cancer is staged (for example PSMA based imaging). This might refine eligibility and change definitions of high and low volume cancer.

Conclusion

Using hospital registry data from the NCDB, we evaluated national practice patterns among patients with regional and distant metastatic prostate cancer. We found that local therapy was undertaken in the majority of men with regional disease, and less common in the metastatic setting. Age was a major determinant of the receipt of any local therapy, as well as the selection of prostatectomy or radiation therapy. Randomized trials are needed to refine patient selection and improve overall accessibility.

Table 1. Demographics and Clinical Characteristics at Diagnosis of 1066298 Men with Prostate Cancer

	No. of Patients (%)				
Characteristic	**All Ages (n = 1066298)**	**Age <50 years (n = 39355)**	**Age 50-70 years (n = 720573)**	**Age ≥70 (n = 306370)**	**P**
Year of Diagnosis					<.001
2004-2007	408260(38)	14861(38)	264166(37)	129233(42)	
2008-2011	414446(39)	16429(42)	287178(40)	110839(36)	
2012-2014	243592 (23)	8065 (20)	169229 (23)	66298 (22)	
PSA(IQR)	6.1(4.5, 9.9)	5.1 (3.6, 8.0)	5.8 (4.4, 8.9)	7.3 (5.0, 12.9)	<.001
<20	829760 (78)	31026 (79)	576439 (80)	222295 (73)	
20~40	44760 (4)	1337 (3)	25410 (4)	18013 (6)	
>40	64862 (6)	1910 (5)	37030 (5)	25922 (8)	
Missing	126916 (12)	5082 (13)	81694 (11)	40140 (13)	
cT stage					<.001
T1	658255 (62)	24454 (62)	453030 (63)	180771 (59)	
T2	262806 (25)	8617 (22)	169270 (23)	84919 (28)	
T3	31954 (3)	940 (2)	19881 (3)	11133 (4)	
T4	8562 (1)	281 (1)	3949 (1)	4332 (1)	
TX	104721 (10)	5063 (13)	74443 (10)	25215 (8)	
cM stage					<.001
M0	1028178 (96)	38218 (97)	702905 (98)	287055 (94)	
M1	38120 (4)	1137 (3)	17668 (2)	19315 (6)	
cN stage					<.001
N0&X	1048409 (98)	38633 (98)	710111 (99)	299665 (98)	
N1	17889 (2)	722 (2)	10462 (1)	6705 (2)	
Gleason Score					<.001
≤6	433726 (41)	19773 (50)	310620 (43)	103333 (34)	.
7	400249 (38)	13768 (35)	277426 (39)	109055 (36)	
≥8	156364 (15)	3049 (8)	85214 (12)	68101 (22)	
Missing	75959 (7)	2765 (7)	47313 (7)	25881 (8)	
Race					<.001
non-hispanic white	766082 (72)	23975 (61)	512586 (71)	229521 (75)	
non-hispanic black	144050 (14)	9333 (24)	104039 (14)	30678 (10)	
other/unknown	156166 (15)	6047 (15)	103948 (14)	46171 (15)	
Insurance Status					<.001
any insurance	1024630 (96)	37349 (95)	689367 (96)	297914 (97)	
uninsured	18289 (2)	1073 (3)	15128 (2)	2088 (1)	
Missing	23379 (2)	933 (2)	16078 (2)	6368 (2)	
Non–high school graduation, %[a]					<.001
≥29	153011 (14)	5653 (14)	102533 (14)	44825 (15)	
20–28.9	221367 (21)	7895 (20)	147614 (20)	65858 (22)	
14–19.9	239388 (22)	8265 (21)	159868 (22)	71255 (23)	
<14	414530 (39)	15929 (40)	284589 (39)	114012 (37)	
Missing	38002 (4)	1613 (4)	25969 (4)	10420 (3)	
Regional income[b]					<.001

<$30,000	123872 (12)	4308 (11)	82306 (11)	37258 (12)	
$30,000–$35,999	169186 (16)	5389 (14)	111809 (16)	51988 (17)	
$36,000–$45,999	277518 (26)	9440 (24)	184654 (26)	83424 (27)	
≥$46,000	457826 (43)	18606 (47)	315923 (44)	123297 (40)	
Missing	37896 (4)	1612 (4)	25881 (4)	10403 (3)	
Comorbidity					<.001
0 (None)	903383 (85)	35688 (91)	614057 (85)	253638 (83)	
1	138148 (13)	3282 (8)	92453 (13)	42413 (14)	
2 (Highest)	24767 (2)	385 (1)	14063 (2)	10319 (3)	
Population Density					<.001
Metro Counties	850458 (80)	33138 (84)	577457 (80)	239863 (78)	
Urban Counties	161510 (15)	4368 (11)	107272 (15)	49870 (16)	
Rural Counties	23158 (2)	601 (2)	14944 (2)	7613 (2)	
Missing	31172 (3)	1248 (3)	20900 (3)	9024 (3)	
Facility Characteristics					
Region					<.001
Northeast	225894 (21)	8483 (22)	151912 (21)	65499 (21)	
South	385570 (36)	15572 (40)	264708 (37)	105290 (34)	
Midwest	281096 (26)	9300 (24)	187812 (26)	83984 (27)	
West	173008 (16)	5270 (13)	116141 (16)	51597 (17)	
Missing	730 (0)	730 (2)	0 (0)	0 (0)	
Facility Type					<.001
CCP	96448 (9)	2286 (6)	56908 (8)	37254 (12)	
Comprehensive CCP	465142 (44)	13776 (35)	303666 (42)	147700 (48)	
Academic/research	394690 (37)	18023 (46)	284573 (39)	92094 (30)	
Integrated cancer program	109288 (10)	4540 (12)	75426 (10)	29322 (10)	
Missing	730 (0)	730 (2)	0 (0)	0 (0)	
Distance from facility[c]					<.001
quintiles1 (nearest)	211947 (20)	6185 (16)	130836 (18)	74926 (24)	
quintiles2	212139 (20)	7119 (18)	137946 (19)	67074 (22)	
quintiles3	210563 (20)	7887 (20)	143422 (20)	59254 (19)	
quintiles4	211027 (20)	8383 (21)	146707 (20)	55937 (18)	
quintiles5 (farthest)	210988 (20)	9361 (24)	155634 (22)	45993 (15)	
Missing	9634 (1)	420 (1)	6028 (1)	3186 (1)	

Abbreviations: PSA, prostate-specific antigen; IQR, interquartile range; CCP, Community Cancer Program; cM1, clinically positive for metastasis; cN1, clinically positive lymph nodes.

[a] Non-High school graduation level was derived from the number of adults in the patient's zip code who did not graduate from high school.

[b] Regional income was estimated by matching the patient's zip code recorded at the time of diagnosis against files derived from the 2012 American Community Survey data (spanning the years 2008-2012 and adjusted for 2012 inflation).

[c] Distance from facility was defined as the distance (in miles) from the patient's zip code centroid to the reporting facility's street address.

Table 2. Univariate and Multivariable Logistic Regression Analyses Predicting Diagnosed with Metastatic Prostate Cancer in 1066298 Men between 2004 and 2014

	Univariate Analysis		Multivariate Analysis	
Characteristics	**OR (95% CI)**	**P**	**OR (95% CI)**	**P**
Age				
≥70	2.09 (1.97,2.22)	<.001	2.13 (2.01,2.26)	<.001
50-70	0.87 (0.82,0.92)	<.001	0.85 (0.81,0.91)	<.001
<50	ref		ref	
Year of Diagnosis				
2012-2014	2.25 (2.19,2.30)	<.001	2.33 (2.27,2.39)	<.001
2008-2011	1.32 (1.29,1.36)	<.001	1.39 (1.35,1.42)	<.001
2004-2007	ref		ref	
Race				
Black (non-Hispanic)	1.61 (1.57,1.66)	<.001	1.33 (1.29,1.37)	<.001
Other/unknown	1.17 (1.14,1.20)	<.001	1.07 (1.04,1.10)	<.001
White (non-Hispanic)	ref		ref	
Insurance Status				
Uninsured	3.94 (3.77,4.12)	<.001	4.27 (4.08,4.47)	<.001
With any insurance	ref		ref	
Non–high school graduation, %[a]				
≥29	1.72 (1.68,1.77)	<.001	1.32 (1.26,1.37)	<.001
20–28.9	1.33 (1.30,1.37)	<.001	1.17 (1.13,1.21)	<.001
14–19.9	1.20 (1.17,1.24)	<.001	1.13 (1.09,1.16)	<.001
<14	ref		ref	
Regional income[b]				
<$30,000	1.74 (1.69,1.79)	<.001	1.26 (1.21,1.31)	<.001
$30,000–$35,999	1.35 (1.31,1.39)	<.001	1.15 (1.11,1.19)	<.001
$36,000–$45,999	1.25 (1.22,1.28)	<.001	1.10 (1.07,1.14)	<.001
≥$46,000	ref		ref	
Comorbidity				
2 (Highest)	3.04 (2.92,3.17)	<.001	2.37 (2.27,2.48)	<.001
1	1.26 (1.23,1.30)	<.001	1.15 (1.12,1.18)	<.001
0 (None)	ref		ref	
Population Density				
Urban Counties	0.96 (0.93,0.98)	0.001	1.04 (1.01,1.08)	<.001
Rural Counties	0.98 (0.92,1.05)	0.58	1.12 (1.04,1.20)	<.001
Metro Counties	ref		ref	
Facility Characteristics				
Region				

Northeast	0.98 (0.95,1.01)	0.26	0.88 (0.85,0.91)	<.001
South	0.92 (0.89,0.95)	<.001	0.78 (0.76,0.80)	<.001
Midwest	1.00 (0.97,1.04)	0.81	0.92 (0.89,0.94)	<.001
West	ref		ref	
Facility Type				
CCP	1.48 (1.42,1.54)	<.001	1.19 (1.14,1.25)	<.001
CCP Conprehensive	1.01 (0.97,1.04)	0.70	0.98 (0.94,1.01)	0.20
Academic/research	1.05 (1.02,1.09)	0.01	1.09 (1.05,1.13)	<.001
Integrated cancer program	ref		ref	
Distance from facility[c]				
quintiles1 (nearest)	2.06 (2.00,2.13)	<.001	1.85 (1.78,1.92)	<.001
quintiles2	1.59 (1.53,1.64)	<.001	1.56 (1.50,1.62)	<.001
quintiles3	1.29 (1.25,1.34)	<.001	1.35 (1.30,1.40)	<.001
quintiles4	1.20 (1.16,1.25)	<.001	1.23 (1.18,1.28)	<.001
quintiles5 (farthest)	ref		ref	

Abbreviations: PSA, prostate-specific antigen; IQR, interquartile range; CCP, Community Cancer Program; cM1, clinically positive for metastasis; cN1, clinically positive lymph nodes.

[a] Non-High school graduation level was derived from the number of adults in the patient's zip code who did not graduate from high school.

[b] Regional income was estimated by matching the patient's zip code recorded at the time of diagnosis against files derived from the 2012 American Community Survey data (spanning the years 2008-2012 and adjusted for 2012 inflation).

[c] Distance from facility was defined as the distance (in miles) from the patient's zip code centroid to the reporting facility's street address.

Table 3. Demographics and Clinical Characteristics at Diagnosis of 6882 Men with Node-Positive Prostate Cancer

Characteristic	No. of Patients (%)				
	All Ages (n = 6882)	Age <50 years (n = 252)	Age 50-70 years (n = 4352)	Age ≥70 (n = 2278)	P
Radiation Therapy					0.041
Yes	2508 (36)	84 (33)	1634 (38)	790 (35)	
No	4374 (64)	168 (67)	2718 (62)	1488 (65)	
Radical Prostatectomy					<0.001
Yes	1323 (19)	99 (39)	1075 (25)	149 (7)	
No	5559 (81)	153 (61)	3277 (75)	2129 (93)	
PSA					<0.001
<20	3286 (48)	99 (39)	2144 (49)	1043 (46)	
20~40	1178 (17)	46 (18)	734 (17)	398 (17)	
>40	1869 (27)	89 (35)	1148 (26)	632 (28)	
Missing	549 (8)	18 (7)	326 (7)	205 (9)	
T stage					<0.001

T1	1607 (23)	46 (18)	1015 (23)	546 (24)	
T2	2098 (30)	65 (26)	1370 (31)	663 (29)	
T3	2146 (31)	94 (37)	1433 (33)	619 (27)	
T4	768 (11)	36 (14)	411 (9)	321 (14)	
TX	263 (4)	11 (4)	123 (3)	129 (6)	
Gleason Score					<0.001
≤6	319 (5)	15 (6)	203 (5)	101 (4)	
7	1475 (21)	60 (24)	1047 (24)	368 (16)	
≥8	4357 (63)	152 (60)	2717 (62)	1488 (65)	
Missing	731 (11)	25 (10)	385 (9)	321 (14)	
Year of Diagnosis					0.014
2004-2007	2004 (29)	79 (31)	1279 (29)	646 (28)	
2008-2011	2555 (37)	106 (42)	1638 (38)	811 (36)	
2012-2014	2323 (34)	67 (27)	1435 (33)	821 (36)	
Race					<0.001
non-hispanic white	4700 (68)	152 (60)	2895 (67)	1653 (73)	
non-hispanic black	1092 (16)	58 (23)	770 (18)	264 (12)	
other/unknown	1090 (16)	42 (17)	687 (16)	361 (16)	
Insurance Status					<0.001
any insurance	6396 (93)	221 (88)	3978 (91)	2197 (96)	
uninsured	286 (4)	21 (8)	230 (5)	35 (2)	
Missing	200 (3)	10 (4)	144 (3)	46 (2)	
Non–high school graduation, %					0.012
≥29	1168 (17)	42 (17)	790 (18)	336 (15)	
20–28.9	1343 (20)	49 (19)	866 (20)	428 (19)	
14–19.9	1565 (23)	53 (21)	984 (23)	528 (23)	
<14	2534 (37)	101 (40)	1538 (35)	895 (39)	
Missing	272 (4)	7 (3)	174 (4)	91 (4)	
Regional income					0.006
<$30,000	935 (14)	37 (15)	629 (14)	269 (12)	
$30,000–$35,999	1101 (16)	30 (12)	705 (16)	366 (16)	
$36,000–$45,999	1789 (26)	53 (21)	1129 (26)	607 (27)	
≥$46,000	2786 (40)	125 (50)	1716 (39)	945 (41)	
Missing	271 (4)	7 (3)	173 (4)	91 (4)	
Comorbidity					<0.001
0 (None)	5754 (84)	233 (92)	3645 (84)	1876 (82)	
1	911 (13)	17 (7)	595 (14)	299 (13)	
2 (Highest)	217 (3)	2 (1)	112 (3)	103 (5)	
Population Density					0.404
Metro Counties	5492 (80)	212 (84)	3476 (80)	1804 (79)	
Urban Counties	1027 (15)	29 (12)	639 (15)	359 (16)	
Rural Counties	145 (2)	4 (2)	100 (2)	41 (2)	

Missing	218 (3)	7 (3)	137 (3)	74 (3)	
Facility Characteristics					
Region					<0.001
Northeast	1557 (23)	67 (27)	957 (22)	533 (23)	
South	2171 (32)	77 (31)	1410 (32)	684 (30)	
Midwest	1892 (27)	65 (26)	1171 (27)	656 (29)	
West	1253 (18)	34 (13)	814 (19)	405 (18)	
Missing	9 (0)	9 (4)	0 (0)	0 (0)	
Facility Type					<0.001
CCP	676 (10)	26 (10)	401 (9)	249 (11)	
CCP Comprehensive	2702 (39)	75 (30)	1673 (38)	954 (42)	
Academic/research	2886 (42)	123 (49)	1896 (44)	867 (38)	
Integrated cancer program	609 (9)	19 (8)	382 (9)	208 (9)	
Missing	9 (0)	9 (4)	0 (0)	0 (0)	
Distance form facility					<0.001
quintiles1 (nearest)	1561 (23)	46 (18)	918 (21)	597 (26)	
quintiles2	1321 (19)	52 (21)	789 (18)	480 (21)	
quintiles3	1289 (19)	47 (19)	797 (18)	445 (20)	
quintiles4	1338 (19)	56 (22)	887 (20)	395 (17)	
quintiles5 (farthest)	1292 (19)	49 (19)	913 (21)	330 (14)	
Missing	81 (1)	2 (1)	48 (1)	31 (1)	

Abbreviations: PSA, prostate-specific antigen; IQR, interquartile range; CCP, Community Cancer Program; cM1, clinically positive for metastasis; cN1, clinically positive lymph nodes.

[a] Non-High school graduation level was derived from the number of adults in the patient's zip code who did not graduate from high school.

[b] Regional income was estimated by matching the patient's zip code recorded at the time of diagnosis against files derived from the 2012 American Community Survey data (spanning the years 2008-2012 and adjusted for 2012 inflation).

[c] Distance from facility was defined as the distance (in miles) from the patient's zip code centroid to the reporting facility's street address.

Table 4. Demographics and Clinical Characteristics at Diagnosis of 37382 Men with Distant Metastatic Prostate Cancer

	No. of Patients (%)				
Characteristic	**All Ages (n = 37382)**	**Age <50 years (n = 1113)**	**Age 50-70 years (n = 17308)**	**Age ≥70 (n = 18961)**	**P**
Radiation Therapy					<.001
Yes	1873 (5)	63 (6)	1055 (6)	755 (4)	
No	35509 (95)	1050 (94)	16253 (94)	18206 (96)	
Radical Prostatectomy					<.001
Yes	537 (1)	34 (3)	415 (2)	88 (0)	
No	36845 (99)	1079 (97)	16893 (98)	18873 (100)	

PSA					<.001
<20	8400 (22)	239 (21)	3970 (23)	4191 (22)	
20~40	4424 (12)	118 (11)	2001 (12)	2305 (12)	
>40	20009 (54)	642 (58)	9527 (55)	9840 (52)	
Missing	4549 (12)	114 (10)	1810 (10)	2625 (14)	
T stage					<.001
T1	8999 (24)	236 (21)	4284 (25)	4479 (24)	
T2	8292 (22)	230 (21)	3914 (23)	4148 (22)	
T3	4331 (12)	160 (14)	2257 (13)	1914 (10)	
T4	5038 (13)	179 (16)	2375 (14)	2484 (13)	
TX	10722 (29)	308 (28)	4478 (26)	5936 (31)	
N stage					<.001
N0&X	26760 (72)	659 (59)	11432 (66)	14669 (77)	
N1	10622 (28)	454 (41)	5876 (34)	4292 (23)	
Gleason Score					<.001
≤6	1028 (3)	35 (3)	458 (3)	535 (3)	
7	4384 (12)	141 (13)	2217 (13)	2026 (11)	
≥8	20285 (54)	613 (55)	9836 (57)	9836 (52)	
Missing	11685 (31)	324 (29)	4797 (28)	6564 (35)	
Year of Diagnosis					0.01
2004-2007	10270 (27)	358 (32)	4436 (26)	5476 (29)	
2008-2011	13686 (37)	447 (40)	6457 (37)	6782 (36)	
2012-2014	13426 (36)	308 (28)	6415 (37)	6703 (35)	
Race					<.001
non-hispanic white	24200 (65)	588 (53)	10234 (59)	13378 (71)	
non-hispanic black	7432 (20)	307 (28)	4339 (25)	2786 (15)	
other/unknown	5750 (15)	218 (20)	2735 (16)	2797 (15)	
Insurance Status					<.001
any insurance	34283 (92)	926 (83)	15074 (87)	18283 (96)	
uninsured	2250 (6)	152 (14)	1768 (10)	330 (2)	
Missing	849 (2)	35 (3)	466 (3)	348 (2)	
Non–high school graduation, %					<.001
≥29	7626 (20)	254 (23)	4004 (23)	3368 (18)	
20–28.9	8594 (23)	255 (23)	4077 (24)	4262 (22)	
14–19.9	8205 (22)	240 (22)	3568 (21)	4397 (23)	
<14	11608 (31)	315 (28)	5015 (29)	6278 (33)	
Missing	1349 (4)	49 (4)	644 (4)	656 (3)	
Regional income					<.001
<$30,000	6309 (17)	209 (19)	3207 (19)	2893 (15)	
$30,000–$35,999	6671 (18)	195 (18)	3152 (18)	3324 (18)	
$36,000–$45,999	10082 (27)	279 (25)	4589 (27)	5214 (28)	
≥$46,000	12976 (35)	381 (34)	5720 (33)	6875 (36)	

Missing	1344 (4)	49 (4)	640 (4)	655 (3)	
Comorbidity					<.001
0 (None)	29190 (78)	993 (89)	14159 (82)	14038 (74)	
1	5728 (15)	89 (8)	2294 (13)	3345 (18)	
2 (Highest)	2464 (7)	31 (3)	855 (5)	1578 (8)	
Population Density					0.27
Metro Counties	29966 (80)	900 (81)	13928 (80)	15138 (80)	
Urban Counties	5352 (14)	144 (13)	2475 (14)	2733 (14)	
Rural Counties	813 (2)	28 (3)	356 (2)	429 (2)	
Missing	1251 (3)	41 (4)	549 (3)	661 (3)	
Facility Characteristics					
Region					<.001
Northeast	7931 (21)	191 (17)	3489 (20)	4251 (22)	
South	12998 (35)	415 (37)	6474 (37)	6109 (32)	
Midwest	10255 (27)	303 (27)	4426 (26)	5526 (29)	
West	6172 (17)	178 (16)	2919 (17)	3075 (16)	
Missing	26 (0)	26 (2)	0 (0)	0 (0)	
Facility Type					<.001
CCP	4758 (13)	130 (12)	1973 (11)	2655 (14)	
CCP Comprehensive	15627 (42)	372 (33)	6648 (38)	8607 (45)	
Academic/research	13324 (36)	492 (44)	6985 (40)	5847 (31)	
Integrated cancer program	3647 (10)	93 (8)	1702 (10)	1852 (10)	
Missing	26 (0)	26 (2)	0 (0)	0 (0)	
Distance form facility					<.001
quintiles1 (nearest)	10821 (29)	238 (21)	4605 (27)	5978 (32)	
quintiles2	8374 (22)	236 (21)	3746 (22)	4392 (23)	
quintiles3	6667 (18)	212 (19)	3192 (18)	3263 (17)	
quintiles4	6088 (16)	198 (18)	2992 (17)	2898 (15)	
quintiles5 (farthest)	4878 (13)	209 (19)	2548 (15)	2121 (11)	
Missing	554 (1)	20 (2)	225 (1)	309 (2)	

Abbreviations: PSA, prostate-specific antigen; IQR, interquartile range; CCP, Community Cancer Program; cM1, clinically positive for metastasis; cN1, clinically positive lymph nodes.

a Non-High school graduation level was derived from the number of adults in the patient's zip code who did not graduate from high school.

b Regional income was estimated by matching the patient's zip code recorded at the time of diagnosis against files derived from the 2012 American Community Survey data (spanning the years 2008-2012 and adjusted for 2012 inflation).

c Distance from facility was defined as the distance (in miles) from the patient's zip code centroid to the reporting facility's street address.

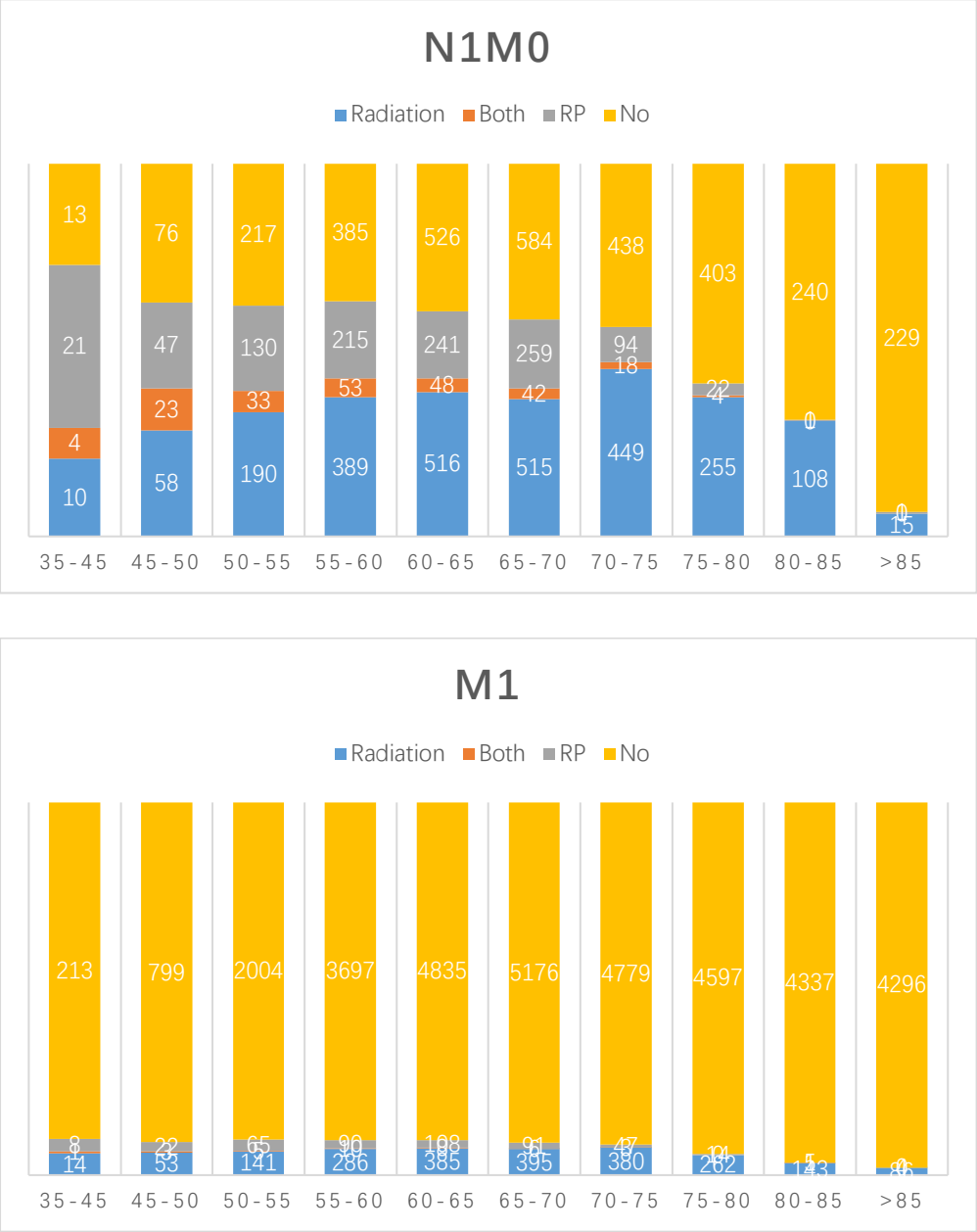

Figure 1. The utilization of local therapy in node-positive and distant metastatic prostate cancer patients by age groups

Table 5. Univariate and Multivariable Logistic Regression Analyses Predicting Local Therapy in 6882 Men with Node-Positive Prostate Cancer between 2004 and 2014

			Univariate Analysis		Multivariate Analysis	
Characteristics	**Num**	**% LT**	**OR (95% CI)**	**P**	**OR (95% CI)**	**P**
Age						
≥70	2098	40%	0.41 (0.31,0.54)	<0.001	0.36 (0.26,0.48)	<0.001
50-70	3956	59%	0.86 (0.65,1.13)	0.283	0.73 (0.54,0.98)	0.035
<50	223	62%	ref		ref	
T stage						
T1	1487	50%	4.52 (3.19,6.40)	<0.001	3.02 (2.09,4.37)	<0.001
T2	1916	53%	5.22 (3.69,7.38)	<0.001	3.53 (2.45,5.10)	<0.001
T3	1940	65%	8.33 (5.89,11.78)	<0.001	5.77 (3.99,8.33)	<0.001
T4	701	35%	2.46 (1.70,3.55)	<0.001	2.02 (1.37,2.98)	<0.001
Tx	233	18%	ref		ref	
PSA						
<20	3013	61%	2.38 (2.10,2.68)	<0.001	2.26 (1.99,2.57)	<0.001
20~40	1104	54%	1.78 (1.52,2.07)	<0.001	1.76 (1.50,2.06)	<0.001
Missing	432	39%	0.96 (0.78,1.19)	0.725	1.20 (0.95,1.52)	0.125
>40	1728	40%	ref		ref	
Gleason Score						
≤6	286	55%	1.05 (0.83,1.34)	0.676	1.11 (0.86,1.43)	0.430
7	1344	60%	1.29 (1.14,1.47)	<0.001	1.23 (1.07,1.40)	0.003
Missing	596	32%	0.42 (0.35,0.50)	<0.001	0.66 (0.54,0.81)	<0.001
≥8	4051	53%	ref		ref	
Year of Diagnosis						
2012-2014	2141	53%	1.19 (1.05,1.35)	0.007	1.36 (1.19,1.56)	<0.001
2008-2011	2325	55%	1.25 (1.11,1.42)	<0.001	1.38 (1.21,1.57)	<0.001
2004-2007	1811	49%	ref		ref	
Race						
Black (non-Hispanic)	1013	46%	0.72 (0.63,0.82)	<0.001	0.76 (0.66,0.89)	<0.001
Other/unknown	980	53%	0.96 (0.84,1.10)	0.557	1.07 (0.92,1.24)	0.403
White (non-Hispanic)	4284	54%	ref		ref	
Insurance Status						
Uninsured	274	39%	0.57 (0.45,0.73)	<0.001	0.55 (0.42,0.72)	<0.001
With any insurance	6003	53%	ref		ref	
Non–high school graduation, %						
≥29	1090	51%	0.92 (0.80,1.06)	0.249		
20–28.9	1300	53%	0.96 (0.84,1.10)	0.554		
14–19.9	1503	53%	0.97 (0.85,1.10)	0.604		

<14	2348	54%	ref			
Regional income						
<$30,000	893	52%	0.90 (0.77,1.05)	0.173		
$30,000–$35,999	1056	54%	0.99 (0.85,1.14)	0.844		
$36,000–$45,999	1700	50%	0.86 (0.76,0.97)	0.016		
≥$46,000	2628	54%	ref			
Comorbidity						
2 (Highest)	207	40%	0.58 (0.44,0.77)	<0.001		
1	847	54%	1.04 (0.90,1.20)	0.611		
0 (None)	5223	53%	ref			
Population Density						
Urban Counties	969	55%	1.13 (0.99,1.30)	0.076		
Rural Counties	140	53%	1.03 (0.73,1.44)	0.879		
Metro Counties	5168	52%	ref			
Facility Characteristics						
Region						
Northeast	1431	56%	1.22 (1.04,1.42)	0.015	1.31 (1.11,1.55)	0.002
South	1954	52%	1.04 (0.90,1.21)	0.588	1.21 (1.03,1.42)	0.021
Midwest	1772	52%	1.04 (0.90,1.21)	0.582	1.13 (0.97,1.33)	0.125
West	1120	51%	ref		ref	
Facility Type						
CCP	615	51%	1.04 (0.82,1.30)	0.770		
Comprehensive CCP	2504	51%	1.03 (0.86,1.24)	0.761		
Academic/research	2592	55%	1.19 (0.99,1.43)	0.059		
Integrated cancer program	566	51%	ref			
Distance from facility						
quintiles1 (nearest)	1469	49%	0.70 (0.60,0.82)	<0.001		
quintiles2	1228	52%	0.78 (0.66,0.92)	0.003		
quintiles3	1195	52%	0.81 (0.69,0.95)	0.010		
quintiles4	1232	54%	0.87 (0.74,1.02)	0.090		
quintiles5 (farthest)	1153	58%	ref			

Table 6. Univariate and Multivariable Logistic Regression Analyses Predicting Local Therapy in 37382 Men with Distant-Metastatic Prostate Cancer between 2004 and 2014

			Univariate Analysis		Multivariate Analysis	
Characteristics	**Num**	**% LT**	**OR (95% CI)**	**P**	**OR (95% CI)**	**P**
Age						
≥70	17605	4%	0.49 (0.39,0.61)	<.001	0.48 (0.37,0.60)	<.001
50-70	15912	8%	0.95 (0.76,1.19)	0.655	0.91 (0.72,1.15)	0.442
<50	992	9%	ref		ref	
T stage						
T1	8395	8%	2.88 (2.49,3.32)	<.001	1.58 (1.35,1.86)	<.001
T2	7668	7%	2.72 (2.35,3.15)	<.001	1.67 (1.42,1.96)	<.001
T3	3966	10%	3.74 (3.19,4.39)	<.001	2.42 (2.04,2.87)	<.001
T4	4631	7%	2.64 (2.24,3.11)	<.001	2.06 (1.73,2.45)	<.001
Tx	9849	3%	ref		ref	
N stage						
N1	9844	6%	0.99 (0.90,1.08)	0.760		
N0&X	24665	6%	ref			
PSA						
<20	7739	14%	4.53 (4.10,5.02)	<.001	3.82 (3.44,4.24)	<.001
20~40	4088	7%	2.12 (1.84,2.45)	<.001	1.91 (1.65,2.21)	<.001
Missing	4092	5%	1.36 (1.15,1.60)	<.001	1.59 (1.34,1.89)	<.001
>40	18590	4%	ref		ref	
Gleason Score						
≤6	954	17%	2.68 (2.25,3.21)	<.001	2.31 (1.91,2.80)	<.001
7	4056	10%	1.55 (1.38,1.74)	<.001	1.58 (1.40,1.78)	<.001
Missing	10687	3%	0.38 (0.33,0.43)	<.001	0.61 (0.53,0.70)	<.001
≥8	18812	7%	ref		ref	
Year of Diagnosis						
2012-2014	12553	6%	0.83 (0.75,0.93)	0.001	1.03 (0.91,1.16)	0.671
2008-2011	12643	7%	1.06 (0.95,1.17)	0.317	1.19 (1.06,1.33)	0.003
2004-2007	9313	7%	ref		ref	
Race						
Black (non-Hispanic)	6915	5%	0.75 (0.67,0.84)	<.001	0.85 (0.75,0.97)	0.014
Other/unknown	5259	6%	0.87 (0.77,0.99)	0.029	0.95 (0.83,1.08)	0.400
White (non-Hispanic)	22335	7%	ref		ref	
Insurance Status						
Uninsured	2121	4%	0.53 (0.42,0.67)	<.001	0.52 (0.41,0.66)	<.001
With any insurance	32388	7%	ref		ref	
Non–high school graduation, %						
≥29	7297	5%	0.74 (0.66,0.84)	<.001		
20–28.9	8234	6%	0.85 (0.76,0.95)	0.005		

14–19.9	7868	6%	0.88 (0.78,0.98)	0.023		
<14	11110	7%	ref			
Regional income						
<$30,000	6042	5%	0.72 (0.63,0.82)	<.001	0.84 (0.73,0.97)	0.018
$30,000–$35,999	6419	6%	0.76 (0.67,0.86)	<.001	0.82 (0.72,0.94)	0.003
$36,000–$45,999	9693	6%	0.86 (0.78,0.96)	0.006	0.92 (0.82,1.02)	0.118
≥$46,000	12355	7%	ref		ref	
Comorbidity						
2 (Highest)	2328	3%	0.41 (0.32,0.52)	<.001	0.57 (0.44,0.72)	<.001
1	5378	5%	0.67 (0.59,0.76)	<.001	0.74 (0.65,0.85)	<.001
0 (None)	26803	7%	ref		ref	
Population Density						
Urban Counties	5133	7%	1.11 (0.99,1.25)	0.086		
Rural Counties	787	5%	0.86 (0.63,1.17)	0.332		
Metro Counties	28589	6%	ref			
Facility Characteristics						
Region						
Northeast	7327	7%	1.01 (0.88,1.16)	0.897		
South	11877	7%	1.04 (0.91,1.18)	0.556		
Midwest	9684	6%	0.92 (0.80,1.05)	0.211		
West	5621	6%	ref			
Facility Type						
Community	4427	7%	1.23 (1.02,1.49)	0.034		
Comprehensive	14471	6%	1.15 (0.97,1.35)	0.104		
Academic/research	12188	7%	1.32 (1.12,1.55)	0.001		
Integrated cancer program	3423	5%	ref			
Distance from facility						
quintiles1 (nearest)	10155	5%	0.75 (0.65,0.87)	<.001		
quintiles2	7906	6%	0.85 (0.73,0.98)	0.028		
quintiles3	6232	7%	1.04 (0.90,1.21)	0.598		
quintiles4	5696	7%	1.02 (0.88,1.19)	0.803		
quintiles5 (farthest)	4520	7%	ref			

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