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Pre-treatment Predictors of Death From Other Causes in Men With Prostate Cancer

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Abstract

Purpose—Most men diagnosed with prostate cancer will die of other causes. Pre-treatment patient characteristics may identify patients who are likely to die of other causes. Accurate stratification of patients by risk of other cause mortality (OCM) may reduce needless treatment preventing morbidity and expense.

Materials and Methods—Using the Cancer of the Prostate Strategic Urologic Research Endeavor (CaPSURE) database, a cohort of men was identified with clinically localized prostate cancer who had definitive treatment with either radical prostatectomy (RP) or radiation therapy (RT), between 1995 and 2004. Pre-treatment patient characteristics were evaluated to determine if early OCM could be predicted.

Results—Of 13,124 subjects enrolled in CaPSURE, 5,070 had clinical T1c-T3a prostatic adenocarcinoma treated with RP (77%) or RT (23%) and post-treatment follow up data. Median follow-up was 3.3 years. The cohort was divided into three groups. The prostate cancer specific mortality (PCSM) group included 55 men (1%) who died from prostate cancer. The 296 men (6%) who died from causes other than prostate cancer comprised the OCM group. A third group contained the 4719 (93%) men surviving at the end of the observation period. Factors that exclusively predicted death from non-prostate cancer causes included age at diagnosis, having a high school education or less, high clinical risk, smoking at time of diagnosis, concurrent non-prostate malignancy, and worse scores on the SF-36 physical function (PF) scale.

Conclusions—Several pre-treatment patient characteristics may identify patients at high risk of non-prostate cancer mortality. Future studies should consider stratifying patients by, or at least reporting, these variables.

Keywords

Prostate cancer; mortality; treatment; active surveillance

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Introduction

According to American Cancer Society estimates, there will be nearly 186,320 new diagnoses of prostate cancer in 2008, but only 28,660 deaths from the disease.¹ Radical prostatectomy and radiation therapy are the mainstays of curative treatment but are each associated with risk of morbidity despite technical advances. In light of this, it is important for physicians to be able to discern patients who would benefit from treatment from those who are more likely to die of other causes and would needlessly suffer treatment-related toxicity.

Recently, the role of active surveillance in prostate cancer has been emphasized. Active surveillance has been shown by a number of trials to be appropriate for patients with low risk of progression defined as a Gleason score ≤ 6 , PSA (prostate specific antigen) ≤ 10 , and tumor stage $\leq T2a$.²⁻⁴ At a minimum, patients under active surveillance receive periodic digital rectal exams, PSA testing, and repeat biopsies. It is now recognized that, while some patients will progress and require aggressive treatment, many patients with prostate cancer will not progress and instead will die from non-prostate cancer causes. A number of nomograms have been employed to address this question and have utilized tumor characteristics, such as grade and PSA, or pathologic stage to predict patient outcomes.⁵⁻⁷ Unfortunately, no model of established pre-treatment factors (such as Gleason score, PSA, age, biopsy factors) is sufficiently robust to discriminate patients at risk of death from prostate cancer from those who will die of other causes.⁸

This study examines whether pre-treatment patient characteristics can predict other cause mortality (OCM) in prostate cancer patients who should therefore choose active surveillance rather than aggressive treatment.

Materials and Methods

This study analyzed data from the Cancer of the Prostate Strategic Urologic Research Endeavor (CaPSURETM) database, a longitudinal, observational disease registry of over 13,000 men with prostate cancer who have been evaluated at 41 community practices, academic sites, and Veteran's Affairs Medical Centers. The data has been collected prospectively since 1995 and represents a cross section of both patients and treatment patterns in the United States. Details of the design and methodology of CaPSURETM have been previously published.⁹

A cohort of men with clinically localized prostate cancer who underwent definitive treatment with either radical prostatectomy (RP) or radiation therapy (external beam or brachytherapy) (RT) between 1995 and 2004 was identified (Figure 1). Pre-treatment patient characteristics were recorded at the time of enrollment in the database and were evaluated to determine if early mortality from non-prostate cancer causes could be predicted. Post-treatment data was collected through office visits, PSA tests, and patient-reported questionnaires. Participating doctors and family members reported patient deaths to the study. State death certificates and the National Death Index (National Center for Health Statistics, Centers for Disease Control and Prevention) were used to determine cause of death.

Chi-square and T-tests were used to compare pre-treatment characteristics of surviving patients, patients who died of causes other than prostate cancer (OCM), and patients with prostate cancer specific mortality (PCSM). Several domains were assessed: patient demographics (age, race, education and income, marital status, insurance coverage, and employment status at diagnosis), disease extent (Gleason grade, serum PSA, cTstage, and overall clinical risk group based on the D'Amico classification¹⁰), co-morbidities at

diagnosis (body mass index, current smoking status, alcohol use, and history of cardiovascular disease (hypertension, heart disease, stroke, lung disease), diabetes, kidney disease or other cancer), baseline laboratory findings (LDH, albumin and creatinine), pre-treatment quality of life (QoL) (SF-36 mental and physical health scales, Karnofsky, IPSS), and primary treatment regimen (RP, RT, any use of androgen deprivation therapy (ADT)).

Outcomes were OCM (decedents vs survivors with prostate cancer related deaths excluded) and, among deceased patients, PCSM vs death due to other cause. Time to OCM and PCSM was analyzed using life table and Kaplan-Meier methods and Cox proportional hazards regression models. Pairwise correlations within the 5 blocks of covariates were reviewed. A preliminary multivariate model for each block was run to identify characteristics associated with each outcome. Significant covariates from these preliminary models were included in a 6th and final model. Since most covariates within each block were closely correlated, the significant individual variables from the preliminary models well represented each block, thus avoiding redundancy and collinearity of covariates in the final analysis. Confirmatory analysis of each outcome with the same covariates and follow up time was done using Poisson regression. Statistical analyses using proc lifetest, proc phreg, proc genmod with Poisson distribution were performed using SAS 9.1 for Windows (SAS Institute, Cary, North Carolina).

Results

Of the 13,124 subjects enrolled in CaPSURETM, 8370 men had localized prostatic adenocarcinoma (clinical T1a-T3a, no N1 or M1), of whom 5,114 were treated with either RP (77%) or RT (23%). Complete post-treatment follow-up data was available for 5,070 (Figure 1). The average age of the men was 63.0 ± 7.75 and the median time from primary treatment to last visit, PSA test, patient questionnaire, or death was 3.3 years.

The cohort of 5070 patients was divided into three groups: the PCSM group with 55 men (1%), the OCM group with 296 men (6%), and a group of 4,719 (93%) men still alive at the end of the observation period. Patient characteristics are illustrated in Table 1. The groups did not differ by race. Patients in the OCM and PCSM cohorts were older than those who survived ($p < 0.01$) and had slightly longer follow-up. PSA values and Gleason scores were higher in the cohort of patients who died of prostate cancer (PCSM) compared with those who died of other causes (OCM), and this group also had a larger percentage of men with T2c and T3a disease. Both groups had PSA and Gleason scores that were higher than those in the surviving group. The majority of surviving patients (79%) underwent radical prostatectomy compared to 55% of the OCM group ($p < 0.01$). The causes of the non-prostate cancer related death are listed in Table 2.

Time to death from other causes or from prostate cancer is shown in Figures 2A and 2B respectively. For the entire cohort, 5 year post-treatment overall survival was 93.8%. Cox proportional hazards regression was performed adjusting for sociodemographics, clinical characteristics, comorbidities, QOL, and treatment. Final models predicting OCM and PCSM covaried for age 65 at diagnosis and education of high school degree or less (correlated with and thus proxies for race, income, employment status at diagnosis, and insurance), clinical risk group (derived from biopsy Gleason, PSA, and cTstage), smoking status at diagnosis, any concurrent non-prostate cancer at diagnosis, presence of cardiovascular disease at diagnosis (correlated with and a proxy for BMI and diabetes), SF36 Physical Function below the age-adjusted norm at diagnosis (correlated and a proxy for SF36 Mental Health and Bodily Pain), and primary treatment of surgery or radiotherapy. Creatinine, Albumin, and LDH levels, Karnofsky and IPSS scores, and marital/relationship

status did not differ between survivors, OCM, and PCSM groups in bivariate analysis and were not included in multivariate analysis.

In proportional hazards analysis to determine the likelihood of OCM compared to survival, men over 65 years had a higher risk of OCM than survivors. Those with a lower level of education (Table 3) had nearly a two-fold increased risk of OCM. Patients who reported being active smokers at the time of diagnosis were two and a half times more likely die of other causes. Patients in the high clinical risk group were almost twice as likely to die of other causes as patients in the low group, but there was no increased risk for patients in the intermediate group. Patients with other cancer diagnosis were twice as likely to die from non-prostate cancer related causes. Finally, patients who scored more than a half-standard deviation below the age-adjusted norm for the Physical Function domain were more than three times as likely to die of non-prostate cancer causes. Factors that were not related to an increased risk of other cause mortality were presence of cardiovascular disease and primary treatment regimen. In confirmatory analysis of OCM using Poisson regression, results were virtually the same as the Cox regression findings. Men over 65 years (OR=2.18 (95% CI 1.34–3.54), those with <=high school degree (OR=1.64 (95% CI 1.09–2.49), intermediate vs low risk (OR=0.56 95% CI 0.33–0.95), current smokers at diagnosis (OR=1.99 95% CI 1.15–3.42), those with other malignancy (OR=1.82 95% CI 1.12–2.95), and those with poor physical function (OR=2.93 (95% CI 1.85–4.63) had greater risk of OCM.

A separate analysis of time to PCSM was performed for 351 patients. In the final proportional hazards regression model after adjusting for the same covariates, none were significantly associated with time to PCSM. Likewise, there were no significant predictors identified in the confirmatory analysis using Poisson regression.

Discussion

In this study we identified several characteristics of men diagnosed with prostate cancer that are associated with an increased risk of dying of a non-prostate cancer cause. As shown in Table 3, patients who were over age 65, had less than a high school diploma, were smokers at diagnosis, had below average age-adjusted physical function before treatment, were in the high clinical risk group, or had another malignancy at diagnosis were between 1.7 and 3.4 times more likely to die of non-prostate cancer causes than of prostate cancer. Coexisting cardiovascular disease, having intermediate risk prostate cancer, and the method of treatment did not increase the risk of other cause mortality.

Because of the natural history of prostate cancer and the competing mortality risks of other comorbidities, most patients diagnosed with prostate cancer, treated or untreated initially, “die with prostate cancer, not of prostate cancer.”¹ Curative treatment for prostate cancer involves, for the most part, surgery or radiation therapy. Both modalities carry a significant risk of side effects ranging from urinary incontinence to erectile dysfunction to proctitis. Since prostate cancer remains the second leading cause of cancer death in men, it is important to identify patients to whom treatment should be offered. In some cases, the prognosis of other diseases will be worse than that of the patient’s prostate cancer. For those without easily identifiable comorbidities, it may be difficult to determine if the benefit of definitive treatment outweighs the risk of toxicity of treatment. To date there has been little information in the existing literature to help guide this assessment.

Several studies have demonstrated that individual comorbidities play an important prognostic role in cancer patients.^{11–16} Boulous et al reported on the effect of comorbidities on non-prostate cancer mortality and suggest the use of a standard scoring system such as the Chronic Disease Score, Index of Coexistent Disease or the Cumulative Illness Rating

Scale.¹⁷ They report that 59% of patients will die of a comorbidity identified at the time of diagnosis of prostate cancer, rather than prostate cancer itself. They also note that a lower socio-economic status is associated with an increased risk of OCM in two unique geographic regions. This association was also demonstrated for breast and lung cancer in a study from the Netherlands suggesting that socioeconomic status impacts OCM in many diseases and may be an important surrogate marker for overall health status or access to care.¹⁸ In Canada, a strong and statistically significant association between community income and survival was observed in cancers of the head and neck region, cervix, uterus, breast, prostate, bladder, and esophagus.¹⁹ A study of 584 patients in the Kaiser Permanente Medical Care program revealed that 54% of patients who died succumbed to their prostate cancer,²⁰ but they included patients with metastatic disease, while ours included only those with clinically localized disease at diagnosis. In their study, black race, age < 65, and advanced prostate cancer characteristics were associated with an increased likelihood of dying of prostate cancer whereas the presence of cardiovascular disease increased the risk of dying of another cause.

In this study, we identified several patient characteristics that can be evaluated at the time of presentation and are associated with death from non-prostate cancer related causes. As in the prior literature, it is again demonstrated that age greater than 65 at the time of diagnosis increases the risk of dying of a non-prostate cancer related cause. Unlike other studies, however, individual medical conditions that are often associated with significant morbidity such as cardiovascular disease, diabetes, and renal disease did not significantly increase the risk of dying of non-prostate cancer related causes. Perhaps not surprisingly, having a diagnosis of a non-prostate cancer malignancy at the time the prostate cancer was diagnosed did double the risk of other cause mortality.

Patients who were smokers at the time of diagnosis had a 2 ½-fold increased risk of death from non-prostate cancer related causes compared to non-smokers. Although there is no evidence to suggest that stopping smoking will improve outcomes in these patients, physicians should take every opportunity to counsel patients about smoking cessation.

Socio-economic status is often cited as a risk factor for mortality and several studies show an association with income, education or both. In this study, a lower level of education was a significant risk factor associated with a 1.7 times increased risk of death from non-prostate cancer related causes compared to patients with an education level above high school. It is possible that this may represent differences in either access to healthcare or the choice to seek out medical attention for various conditions. It must be acknowledged, however, that patients enrolled in any study belong to a subgroup of the general population who have already sought medical treatment for their prostate cancer and therefore have at least some access to medical care. The lesson to be learned here is that physicians should always ensure that patients have a full understanding of their disease and treatment options.

Finally, a poor score on the Physical Function domain of the SF-36 is the parameter that is most strongly correlated with non-prostate cancer related mortality. This suggests that the SF-36, and specifically the Physical Function domain, may address the impact that the patient's disease, multiple comorbidities, and socio-economic status have on overall health better than any of the individual measures alone. The SF-36 is a well validated tool that is used extensively to assess QoL and its association with OCM should be carefully considered. Based on our findings, any future trials that study OCM in prostate cancer patients should include the SF-36 in their analysis.

Conclusion

The ability to differentiate those patients who should undergo aggressive treatment for prostate cancer from those who should be offered less aggressive treatment is important. At present, clinicians can only estimate the risk of non-prostate cancer related mortality. This study for the first time identifies several patient characteristics (including age over 65, high clinical risk, lower level of education, smoking at diagnosis, below average SF-36 scores, and presence of other malignancies) that are correlated with a high risk of OCM and merit further study in prospective trials.

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Standard Abbreviation Key

OCM	Other Cause Mortality
PCSM	Prostate Cancer Specific Mortality
RP	Radical Prostatectomy
RT	Radiation Therapy
CaPSURE	Cancer of the Prostate Strategic Urologic Research Endeavor
PSA	prostate specific antigen
QoL	quality of life
SF-36	Short Form-36 Health Survey

References

1. Cancer Facts and Figures 2007. American Cancer Society; 2007.
2. Roemeling S, Roobol MJ, de Vries SH, Wolters T, Gosselaar C, van Leenders GJ, et al. Active surveillance for prostate cancers detected in three subsequent rounds of a screening trial: characteristics, PSA doubling times, and outcome. *Eur Urol* 2007;51:1244. [PubMed: 17161520]
3. Carter HB, Walsh PC, Landis P, Epstein JI. Expectant management of nonpalpable prostate cancer with curative intent: preliminary results. *J Urol* 2002;167:1231. [PubMed: 11832703]
4. Carter CA, Donahue T, Sun L, Wu H, McLeod DG, Amling C, et al. Temporarily deferred therapy (watchful waiting) for men younger than 70 years and with low-risk localized prostate cancer in the prostate-specific antigen era. *J Clin Oncol* 2003;21:4001. [PubMed: 14581423]
5. Partin AW, Mangold LA, Lamm DM, Walsh PC, Epstein JI, Pearson JD. Contemporary update of prostate cancer staging nomograms (Partin Tables) for the new millennium. *Urology* 2001;58:843. [PubMed: 11744442]
6. D'Amico AV, Whittington R, Malkowicz SB, Fondurulia J, Chen MH, Kaplan I, et al. Pretreatment nomogram for prostate-specific antigen recurrence after radical prostatectomy or external-beam radiation therapy for clinically localized prostate cancer. *J Clin Oncol* 1999;17:168. [PubMed: 10458230]
7. Kattan MW, Zelefsky MJ, Kupelian PA, Scardino PT, Fuks Z, Leibel SA. Pretreatment nomogram for predicting the outcome of three-dimensional conformal radiotherapy in prostate cancer. *J Clin Oncol* 2000;18:3352. [PubMed: 11013275]
8. Kattan MW, Eastham JA, Wheeler TM, Maru N, Scardino PT, Erbersdobler A, et al. Counseling men with prostate cancer: a nomogram for predicting the presence of small, moderately differentiated, confined tumors. *J Urol* 2003;170:1792. [PubMed: 14532778]

9. Lubeck DP, Litwin MS, Henning JM, Stier DM, Mazonson P, Fisk R, et al. The CaPSURE database: a methodology for clinical practice and research in prostate cancer. CaPSURE Research Panel. Cancer of the Prostate Strategic Urologic Research Endeavor. Urology 1996;48:773. [PubMed: 8911524]
10. D'Amico AV, Whittington R, Malkowicz SB, Schultz D, Blank K, Broderick GA, et al. Biochemical outcome after radical prostatectomy, external beam radiation therapy, or interstitial radiation therapy for clinically localized prostate cancer. Jama 1998;280:969. [PubMed: 9749478]
11. Extermann M, Overcash J, Lyman GH, Parr J, Balducci L. Comorbidity and functional status are independent in older cancer patients. J Clin Oncol 1998;16:1582. [PubMed: 9552069]
12. Singh B, Bhaya M, Stern J, Roland JT, Zimble M, Rosenfeld RM, et al. Validation of the Charlson comorbidity index in patients with head and neck cancer: a multi-institutional study. Laryngoscope 1997;107:1469. [PubMed: 9369392]
13. Battafarano RJ, Piccirillo JF, Meyers BF, Hsu HS, Guthrie TJ, Cooper JD, et al. Impact of comorbidity on survival after surgical resection in patients with stage I non-small cell lung cancer. J Thorac Cardiovasc Surg 2002;123:280. [PubMed: 11828287]
14. Newschaffer CJ, Bush TL, Penberthy LT. Comorbidity measurement in elderly female breast cancer patients with administrative and medical records data. J Clin Epidemiol 1997;50:725. [PubMed: 9250271]
15. West DW, Satariano WA, Ragland DR, Hiatt RA. Comorbidity and breast cancer survival: a comparison between black and white women. Ann Epidemiol 1996;6:413. [PubMed: 8915472]
16. Sabin SL, Rosenfeld RM, Sundaram K, Har-el G, Lucente FE. The impact of comorbidity and age on survival with laryngeal cancer. Ear Nose Throat J 1999;78:578. [PubMed: 10485151]
17. Boulos DL, Groome PA, Brundage MD, Siemens DR, Mackillop WJ, Heaton JP, et al. Predictive validity of five comorbidity indices in prostate carcinoma patients treated with curative intent. Cancer 2006;106:1804. [PubMed: 16534794]
18. Schrijvers CT, Coebergh JW, Mackenbach JP. Socioeconomic status and comorbidity among newly diagnosed cancer patients. Cancer 1997;80:1482. [PubMed: 9338473]
19. Mackillop WJ, Zhang-Salomons J, Groome PA, Paszat L, Holowaty E. Socioeconomic status and cancer survival in Ontario. J Clin Oncol 1997;15:1680. [PubMed: 9193369]
20. Satariano WA, Ragland KE, Van Den Eeden SK. Cause of death in men diagnosed with prostate carcinoma. Cancer 1998;83:1180. [PubMed: 9740084]

Figure 1. Schema of inclusion/exclusion criteria for analytic sample
RP = radical prostatectomy, RT = radiation therapy

Figure 2. Time to OCM or PCSM

(A) From the 5070 men in the study sample, the time to death from non-prostate related cancer causes (OCM) for the 5015 men who did not die of prostate cancer was analyzed using a Kaplan-Meier plot. Of these, 93.8% were alive at the five year follow-up point. (B) The 351 men who died during the follow-up period were independently analyzed using a Kaplan-Meier plot to determine the time to death from prostate cancer (PCSM). At the five year follow-up point, 55 (15.2%) of the men who had died had succumbed to their prostate cancer.

Table 1**Patient Demographics**

	Total (n=5070)	PCSM (n=55)	OCM (n=296)	Surviving (n=4719)
Mean Age	63	67	68	63
Race, n (%)				
Caucasian	4394 (87)	49 (89)	249 (84)	4096 (87)
African-American	496 (10)	4 (7)	35 (12)	457 (10)
Other	180 (3)	2 (4)	12 (4)	166 (3)
High School Education or Less, n (%)	1497 (38)	14 (33)	130 (55)	1353 (37)
Smoker at Time of Diagnosis, n(%)	420 (11)	4 (10)	46 (20)	370 (10)
Other Malignancy, n (%)	200 (5)	4 (8)	12 (5)	185 (4)
Median F/U (years)	3.3	3.9	3.9	3.2
Treatment, n (%)				
RP	3903 (77)	23 (42)	165 (55)	3715 (79)
RT	801 (15)	23 (42)	105 (35)	673 (14)
BT+RT	366 (6)	6 (11)	20 (8)	246 (5)
RP+RT	94 (2)	3 (5)	6 (2)	85 (2)
Stage, n (%)				
T1a	15 (<1)	-	-	15 (<1)
T1b	22 (<1)	1 (2)	3 (1)	18 (<1)
T1c	2525 (50)	13 (24)	94 (32)	2418 (51)
T2a	1104 (22)	9 (16)	68 (23)	1027 (22)
T2b	292 (6)	5 (9)	32 (11)	255 (5)
T2c	1031 (20)	23 (42)	88 (29)	920 (19)
T3a	81 (2)	4 (7)	11 (4)	66 (2)
Mean PSA	8.6	14.2	11.5	8.4
Gleason Score, n (%)	(n=4986)	(n=54)	(n=291)	(n=4641)
2-4	148 (3)	-	14 (5)	134 (3)
5-6	3094 (62)	15 (28)	137 (47)	2942 (63)
7	1368 (27)	21 (39)	96 (33)	1251 (27)
8-10	376 (8)	18 (33)	44 (15)	314 (7)

Table 2**Non-Prostate Cancer Causes of Death**

CAUSE OF DEATH	%
Non-GU cancer	24.73
Coronary artery disease or Heart failure	16.61
Endocarditis, Cardiomyopathy, Dysrhythmia	13.43
Unspecified	13.07
Disease of respiratory system	7.77
Wound infection, Fracture, Congenital or Other injury	3.53
Pulmonary heart disease	2.47
Respiratory arrest	2.47
Septicemia	2.47
Disease of Liver, Gall bladder, Pancreas, or Appendix	2.12
Nervous system disorder (MS, ALS)	1.77
Other GU cancer	1.77
Cerebral hemorrhage, Cerebrovascular disease	1.41
Dementia, Alzheimer's or Parkinson's Disease	1.06
Anemia or other blood disorder	0.71
Aneurysm or Peripheral vascular disease	0.71
Depression, Psychosis, or Drug abuse	0.71
Disease of Kidney, Ureter, Bladder, Urethra	0.71
Hypertension	0.71
Diabetes	0.35
Endocrine or metabolic disorder	0.35
Hypotension or circulatory system disorder	0.35
Mechanical complication of GU device	0.35
Toxic or allergic reaction, complication after procedure	0.35

GU = genitourinary, ALS = amyotrophic lateral sclerosis, MS = multiple sclerosis

Table 3

Adjusted Cox proportional hazards regression predicting time to OCM (n = 2030)

Parameter	HR	<i>p-value</i>	95% CI
Age > 65 at Diagnosis	2.11	0.003	1.29–3.45
High vs. Low Clinical Risk Group	1.85	0.022	1.09–3.14
Intermediate vs. Low Clinical Risk Group	0.98	0.94	0.58–1.66
Education Level of High School or Less	1.67	0.015	1.11–2.54
Smoker at Diagnosis	2.72	0.0003	1.59–4.68
SF36 PF One-Half Standard Deviation Below Age-Adjusted Norm	3.41	<0.0001	2.17–5.36
Other Malignancy at Diagnosis	2.03	0.004	1.25–3.29
Cardiovascular Disease	0.96	0.84	0.62–1.48
Primary treatment Radiation Therapy vs. Radical Prostatectomy	1.54	0.075	0.96–2.49