

Predictors of Follow-Up Visits Post Radical Prostatectomy

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Abstract

Long-term follow-up care among prostate cancer patients is important as biochemical recurrence can occur many years after diagnosis, with 20%–30% of men experiencing biochemical recurrence within 10 years of treatment. This study examined predictors of follow-up care among 1,158 radical prostatectomy patients, treated at the Washington University in St. Louis, within 6 months, 1 year, and 2 years post surgery. Predictors examined included age at surgery, race (Black vs. White), rural/urban status, education, marital status, and prostate cancer aggressiveness. Multivariable logistic regression was used to assess the association between the predictors and follow-up visits with a urologist in 6 months, the 1st year, and the 2nd year post surgery. In a secondary analysis, any follow-up visit with a prostate-specific antigen (PSA) test was included, regardless of provider type. Men that were Black (6 months OR: 0.60; 95% CI [0.36, 0.99], 1 year OR: 0.34; 95% CI [0.20, 0.59], 2 year OR: 0.41; 95% CI [0.25, 0.68]), resided in a rural residence (1 year OR: 0.61; 95% CI [0.44, 0.85], 2 year OR: 0.41; 95% CI [0.25, 0.68]), or were unmarried (2 year OR: 0.69; 95% CI [0.49, 0.97]) had a reduced odds of follow-up visits with a urologist. In models where any follow-up visit with a PSA test was examined, race remained a significant predictor of follow-up. The results indicate that Black men, men residing in a rural residence, and unmarried men may not receive adequate long-term follow-up care following radical prostatectomy. These men represent a high-risk group that could benefit from increased support post treatment.

Keywords

prostate cancer, follow-up, Black men, survivors, radical prostatectomy

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Background and Research Question

According to Surveillance, Epidemiology, and End Results (SEER), 99% of men with prostate cancer will survive 5 years after diagnosis (SEER, 2017). The American Cancer Society (ACS) and the National Comprehensive Cancer Network (NCCN) recommend that after completion of definitive prostate cancer treatment, prostate-specific antigen (PSA) levels be measured every 6 to 12 months for the first 5 years, and every year thereafter (Skolarus et al., 2014). Despite the high number of prostate cancer survivors, patients are not routinely given clear guidance on how and where to obtain proper follow-up care (Earle & Neville, 2004; Jacobs & Shulman, 2017; Rasper & Terlecki, 2016; Resnick, 2015; Rubinstein et al., 2017). Regular and consistent follow-up among prostate cancer patients is especially important as up to 20%–30% of men will experience recurrence within 10 years of definitive treatment, with many men experiencing biochemical recurrence more than a year

after diagnosis (Kolodziej, 2014; Kurbegovic et al., 2017; Paller & Antonarakis, 2013).

Few studies have examined receipt of follow-up care specifically among prostate cancer survivors. In a SEER-Medicare study, Onukwugha et al. observed that 16% of men with stage I to stage III prostate cancer did not see a urologist within 1 year of diagnosis (Onukwugha et al., 2014). This study builds on previous research by examining predictors of follow-up among prostate cancer patients, including men diagnosed before 65 years of age,

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in three specific periods including: within 6 months, in the 1st year, and in the 2nd year post surgery. Importantly, this study accounted for visits that occurred outside a urology clinic as routine PSA tests often occur in a primary care setting.

Design and Data Collection

Study Population and Data Collection

The Washington University Prostate Cancer Prospective Cohort (PCPC) consists of men diagnosed with biopsy confirmed prostate cancer and treated at the Washington University School of Medicine in St. Louis from 2003 to 2010. Sociodemographic information was collected through a mail survey. Recruitment occurred at the time of diagnosis and prior to prostate cancer treatment. Follow-up visit dates, clinical characteristics of disease, and treatment type were determined by medical records abstraction. There was a biannual review of medical charts. Men that received follow-up care outside the Washington University School of Medicine system were contacted by phone and mail, and medical records were obtained from the current provider. Follow-up of medical records was 98% complete. Participant consent was obtained at time of enrollment, and the study was approved by the Institutional Review Board at the Washington University in St. Louis School of Medicine.

One thousand two hundred and seventeen men with prostate cancer enrolled in the Washington University PCPC and fully completed the survey. Men who identified as Black or White and were treated with radical prostatectomy were eligible for the current study. Men with an unknown surgery date or missing any covariate information were excluded. The final analytic sample consisted of 1,158 men.

Predictors, Outcome, and Statistical Analysis

The primary outcomes of interest were follow-up urology visits within 6 months, in the 1st year, and in the 2nd year post radical prostatectomy, based on ACS and NCCN recommended guidelines. To further capture all post-surgery follow-up visits that may have occurred at a primary clinic, in a secondary analysis all visits with a PSA test regardless of provider type were examined. Visits that occurred in the first 6 weeks after surgery were excluded to ensure that visits for routine postoperative care were not captured.

Key predictors of follow-up that were evaluated included age at surgery, race, residence, education, marital status, and disease aggressiveness. Age at surgery and disease aggressiveness were determined using medical records. Age at surgery was defined as age at time of

radical prostatectomy. Disease aggressiveness was determined using pathological Gleason sum and stage at time of radical prostatectomy. High-risk prostate cancer was defined as a pathological Gleason sum of 4+3, Gleason sum ≥ 8 , or pathological stage $\geq T3$. All other men were included in the low-risk group. Race (Black or White), education (less than college vs. some college or more), and marital status (married vs. not married) were all based on self-report. Residence at surgery (urban vs. rural) was determined using census-tract Rural-Urban Commuting Area Codes (United States Department of Agriculture, 2017).

Logistic regression was used to assess the association between each of the predictors and having a follow-up urology visit at three time periods post radical prostatectomy: in 6 months, in the 1st year, and in the 2nd year. Each predictor was evaluated independently (unadjusted model) and in a multivariable model that included all predictors (age at surgery, race, residence, education, marital status, and disease aggressiveness). In a secondary analysis, all follow-up visits with a PSA test, regardless of provider type, were examined using the approach described previously.

All analyses were conducted using SAS 9.4 (Cary, NC).

Findings

Characteristics of the study cohort are presented in Table 1. The mean age at time of radical prostatectomy was 61 years. The majority of research participants were White (93.9%, $n = 1,087$). Most men resided in an urban residence (65.8%, $n = 762$), had some college education or above (72.5%, $n = 840$), and were married (86.1%, $n = 997$) at time of prostate cancer diagnosis. Approximately a third of the patient sample ($n = 382$) has high-risk prostate cancer based on a combined measure of Gleason sum and stage. Sixty-eight percent ($n = 787$) of men had a follow-up visit within 6 months of surgery and 82.8% ($n = 959$) had a follow-up visit within 1 year of surgery. During the 2nd year post surgery, 64.4% ($n = 746$) patients had a urology visit. The proportion of patients with follow-up visits increased when non-urology visits with a PSA test were included.

See Table 2 for predictors of follow-up visits with a urologist. Black race was associated with a reduced odds of urology follow-up visits within 6 months (OR: 0.60; 95% CI [0.36, 0.99]), the 1st year (OR: 0.34; 95% CI [0.20, 0.59]), and the 2nd year (OR: 0.41; 95% CI [0.25, 0.68]) post surgery in models adjusted for age at surgery, race, residence, education, marital status, and disease aggressiveness. Residing in a rural residence was associated with a reduced odds of long-term follow-up visits with a urologist (1st year, OR: 0.61; 95% CI [0.44, 0.85]; 2nd year, OR: 0.72; 95% CI [0.56, 0.94]). Unmarried men

Table 1. Washington University Prostate Cancer Cohort Characteristics ($n = 1,158$).

Patient characteristics	N (%)
Age at surgery,^a mean (SD)	60.6 (7.0)
Race	
White	1,087 (93.9)
Black	71 (6.1)
Residence	
Urban	762 (65.8)
Rural	396 (34.2)
Education	
Some college or more	840 (72.5)
Less than college	318 (27.5)
Marital status	
Married	997 (86.1)
Not married	161 (13.9)
Disease aggressiveness^b	
High risk	382 (33.0)
Low risk	776 (67.0)
Urologist visit in 6 months post radical prostatectomy^c	
Yes	787 (68.0)
No	371 (32.0)
Urologist visit in 1st year post radical prostatectomy^c	
Yes	959 (82.8)
No	199 (17.2)
Urologist visit in 2nd year post radical prostatectomy	
Yes	746 (64.4)
No	412 (35.6)
Any follow-up visit in 6 months post radical prostatectomy^{c,d}	
Yes	868 (75.0)
No	290 (25.0)
Any follow-up visit in 1st year post radical prostatectomy^{c,d}	
Yes	1,035 (89.4)
No	123 (10.6)
Any follow-up visit in 2nd year post radical prostatectomy^d	
Yes	900 (77.7)
No	258 (22.3)

Note. ^aAge at surgery defined as a continuous variable. ^bHigh risk was defined as Gleason score of 4 + 3 or Gleason sum ≥ 8 or stage ≥ 3 .

^cVisits in the first 6 weeks after radical prostatectomy were excluded.

^dIncluded urology clinic visits or any follow-up visit with a PSA test including primary care. SD = standard deviation.

had reduced odds of a follow-up visit with a urologist in the 2nd year post surgery (OR: 0.69; 95% CI [0.49, 0.97]). No association was observed between age at surgery, education, and disease aggressiveness at any time period.

In a secondary analysis of all visits with a PSA test regardless of provider type (Table 3), Black men continued to be at increased risk for inadequate follow-up care

at all three time periods despite the more comprehensive definition of follow-up care (6 months, OR: 0.15; 95% CI [0.04, 0.52], 1st year, OR: 0.10; 95% CI [0.03, 0.34], 2nd year, OR: 0.04; 95% CI [0.00, 0.29]). No other predictor examined was significantly associated with follow-up care when this more comprehensive definition was utilized.

Recommendations and Limitations

In this longitudinal study, men who were Black, lived in a rural residence, or were unmarried were less likely to have follow-up visits with a urologist at ACS and NCCN recommended time points. Black men were significantly less likely to receive follow-up care even when for follow-up visits that did not occur with a urologist were accounted for. This study is among the first studies to examine predictors of follow-up among prostate cancer patients more than a year after diagnosis, a clinically important period where patients remain at risk for biochemical recurrence (Kolodziej, 2014; Paller & Antonarakis, 2013).

Consistent with this study, in a SEER-Medicare cohort, Onukwugha et al. reported that Black men with prostate cancer were less likely to see a urologist while married men or those residing in an urban residence were more likely to see a urologist within 1 year of diagnosis (Onukwugha et al., 2014). The results of this study build on Onukwugha et al. by examining follow-up visits within 6 months and during the 2nd year in addition to 1st year. Moreover, Onukwugha et al. was limited to elderly men on Medicare (≥ 65 years), with a mean age of prostate cancer diagnosis of 74 years (Onukwugha et al., 2014). By contrast, the mean age at prostate cancer diagnosis in this study was 61, increasing the generalizability of the results to younger men with prostate cancer. A strength of this study is that it captured visits that occurred outside urology. This is necessary as routine PSA tests often occur in the primary care setting.

Despite guidelines suggesting follow-up PSA screenings every 6–12 months following prostate cancer treatment, the study results suggest that a quarter of prostate cancer patients don't receive follow-up care just 6 months after surgery even when visits that occur outside a urology clinic are accounted for (Skolarus et al., 2014). The results suggest that the receipt of timely and guideline-concordant care can be challenging for prostate cancer survivors.

Cancer patients often receive limited posttreatment guidance. A survey of oncologists reported that only 64% always or almost always discuss survivorship care with patients (Blanch-Hartigan et al., 2014). Moreover, only 32% of oncologists discussed who would provide follow-up care

Table 2. Odds Ratios (95% CI) for Predictors of Follow-Up Visits With a Urologist at 6 Months, 1 Year, and 2 Years Post Radical Prostatectomy.

Predictor	Urologist visit within 6 months ^a OR (95% CI)		Urologist visit within 1st year ^a OR (95% CI)		Urologist visit within 2nd year OR (95% CI)	
	Un-adjusted	Adjusted ^d	Un-adjusted	Adjusted ^d	Un-adjusted	Adjusted ^d
Age at surgery^b	1.00 (0.98, 1.02)	1.00 (0.98, 1.02)	0.99 (0.97, 1.01)	0.99 (0.97, 1.01)	0.99 (0.97, 1.01)	1.00 (0.98, 1.01)
Race						
White	Ref	Ref	Ref	Ref	Ref	Ref
Black	0.63 (0.38, 1.02)	0.60 (0.36, 0.99)	0.38* (0.22, 0.63)	0.34* (0.20, 0.59)	0.43* (0.26, 0.70)	0.41* (0.25, 0.68)
Residence						
Urban	Ref	Ref	Ref	Ref	Ref	Ref
Rural	0.81 (0.63, 1.05)	0.76 (0.58, 1.00)	0.70* (0.51, 0.95)	0.61* (0.44, 0.85)	0.78 (0.61, 1.00)	0.72* (0.56, 0.94)
Education						
Some college or more	Ref	Ref	Ref	Ref	Ref	Ref
Less than college	0.94 (0.72, 1.24)	1.00 (0.75, 1.33)	0.88 (0.63, 1.23)	1.00 (0.71, 1.42)	0.82 (0.63, 1.07)	0.89 (0.67, 1.17)
Marital status						
Married	Ref	Ref	Ref	Ref	Ref	Ref
Not married	0.81 (0.57, 1.15)	0.81 (0.57, 1.15)	0.68 (0.45, 1.02)	0.69 (0.45, 1.04)	0.68* (0.48, 0.95)	0.69* (0.49, 0.97)
Disease aggressiveness^c						
Low risk	Ref	Ref	Ref	Ref	Ref	Ref
High risk	1.14 (0.88, 1.49)	1.17 (0.89, 1.53)	0.96 (0.70, 1.33)	1.01 (0.72, 1.40)	1.07 (0.83, 1.38)	1.11 (0.86, 1.45)

Note. ^aVisits in the first 6 weeks after radical prostatectomy were excluded. ^bAge at surgery defined as a continuous variable. ^cHigh risk was defined as Gleason score of 4 + 3 or Gleason sum ≥ 8 or stage ≥ 3 . ^dModels included age at surgery, race, residence, education, marital status, and disease aggressiveness.

*Statistically significant at $\alpha = .05$.

and less than 5% provided a written survivorship care plan (Blanch-Hartigan et al., 2014). Beyond limited patient guidance, there is a lack of clarity on who should be responsible for follow-up care. Fifty-one percent of primary care providers (PCPs) support a shared care model between PCPs and specialty providers, while 59% of specialists strongly support oncology-based survivorship care, according to a randomly distributed national survey of physicians (Cheung et al., 2013). There is some evidence that cancer survivors may be reluctant to get cancer-related follow-up care from PCPs (Hudson et al., 2012). In fact, cancer survivors may be less likely to receive adequate follow-up care even for non-cancer-related health issues (Earle & Neville, 2004).

The dearth of patient guidance and care coordination is compounded by other factors that can impede adequate follow-up care (Jacobs & Shulman, 2017). Lack of social support and psychosocial stress can also be a contributing factor. This study reported that unmarried men were less likely to have follow-up visits with a urologist after 2 years. This is consistent with other studies that have

reported that unmarried men with prostate cancer are at greater risk of death than married men with prostate cancer (Abdollah et al., 2011; Tyson et al., 2013). Other challenges faced by prostate cancer survivors include limited access to care, cost, fear of recurrence, and long-term treatment effects (Davis et al., 2014; Jacobs & Shulman, 2017).

The multitude of challenges faced by cancer survivors clearly suggests the need for increased guidance post treatment. A survey of breast and prostate cancer survivors reported that about 50% of patients would like to receive more information on survivorship care (O'Malley et al., 2016). In particular, patients with comorbidities and Black patients are most likely to want additional information regarding follow-up care (O'Malley et al., 2016). This is consistent with the findings of this study, where Black men were more likely to receive inadequate follow-up care at all three time periods, both at a urologist or other provider that provided a PSA test.

Table 3. Odds Ratios (95% CI) for Predictors of Follow-Up Visits at Any Provider 6 Months, 1 Year, and 2 Years Post Radical Prostatectomy of All PSA Visits^a.

Predictor	Any visit within 6 months ^b OR (95% CI)		Any visit within 1st year ^b OR (95% CI)		Any visit within 2nd year OR (95% CI)	
	Un-adjusted	Adjusted ^e	Un-adjusted	Adjusted ^e	Un-adjusted	Adjusted ^e
Age at surgery^c	1.00 [0.93, 1.05]	1.00 [0.92, 1.05]	0.98 [0.92, 1.04]	0.98 [0.92, 1.05]	0.97 [0.91, 1.03]	0.98 [0.91, 1.05]
Race						
White	Ref	Ref	Ref	Ref	Ref	Ref
Black	0.43* [0.26, 0.70]	0.15* [0.04, 0.52]	0.23* [0.13, 0.39]	0.10* [0.03, 0.34]	0.27* [0.16, 0.43]	0.04* [0.00, 0.29]
Residence						
Urban	Ref	Ref	Ref	Ref	Ref	Ref
Rural	0.79 [0.60, 1.04]	0.96 [0.32, 2.90]	0.61* [0.42, 0.89]	1.15 [0.35, 3.81]	0.70* [0.52, 0.93]	0.41 [0.13, 1.31]
Education						
Some college or more	Ref	Ref	Ref	Ref	Ref	Ref
Less than college	1.04 [0.77, 1.40]	1.67 [0.62, 4.49]	0.83 [0.55, 1.25]	2.25 [0.77, 6.58]	0.70* [0.50, 0.91]	1.30 [0.44, 3.82]
Marital status						
Married	Ref	Ref	Ref	Ref	Ref	Ref
Not married	0.94 [0.64, 1.37]	1.20 [0.33, 4.38]	0.59 [0.37, 0.95]	0.70 [0.19, 2.55]	0.57 [0.39, 0.82]	0.78 [0.18, 3.31]
Disease aggressiveness^d						
Low risk	Ref	Ref	Ref	Ref	Ref	Ref
High risk	1.43* [1.07, 1.92]	1.81 [0.66, 4.96]	0.87 [0.59, 1.29]	0.80 [0.27, 2.34]	1.23 [0.91, 1.67]	1.13 [0.39, 3.27]

Note. ^aIncluded visits with a urologist and any other follow-up visit with a PSA test including primary care. ^bVisits in the first 6 weeks after radical prostatectomy were excluded. ^cAge at surgery defined as a continuous variable. ^dHigh risk was defined as Gleason score of 4 + 3 or Gleason sum ≥ 8 or stage ≥ 3 . ^eModels included age at surgery, race, residence, education, marital status, and disease aggressiveness. PSA = prostate-specific antigen.

*Statistically significant at $\alpha = .05$.

Increased care coordination between patients, providers, and communities is needed to help ensure that prostate care patients receive adequate follow-up care. Although the primary urologist is responsible for follow-up care until there is an explicit transfer of responsibility to a primary care physician, such clinical coordination is not routine (Jacobs & Shulman, 2017; Skolarus et al., 2014). The American Society of Clinical Oncology recommends strategies to be in place that “ensure that every survivor receives a written coordinated treatment summary and follow-up plan” (Jacobs & Shulman, 2017). However, such plans are not often effectively implemented due to lack of reimbursement, uncertainty over who is responsible for implementation, lack of care coordination, and limited evidence on effectiveness (Jacobs & Shulman, 2017). Nonetheless, improved care coordination and survivorship care plans have the potential to improve follow-up. Other potential strategies include academic–public partnerships that work together to broadly disseminate information regarding survivorship (Skolarus et al., 2017).

In this study, several groups that may benefit from increased guidance and support regarding follow-up care were identified, including Black men, men that are unmarried, or men that live in a rural residence. Although this study is limited to a single institution, key strengths of this study include examining follow-up care at three distinct time periods and identification of patient characteristics

that are associated with a decreased likelihood of follow-up visits. Long-term survivorship care plans and clear clinical pathways, particularly for patients that are at increased risk for not receiving follow-up visits, could improve survivorship care for prostate cancer patients (Jacobs & Shulman, 2017).

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