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Original article

Physician visits and the timing of skeletal-related events among men newly diagnosed with metastatic prostate cancer: A cohort analysis

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Abstract

Introduction: Men diagnosed with metastatic prostate cancer (PCa) are at increased risk for skeletal complications which are associated with significant morbidity and mortality. Although both the urologist and the medical oncologist play important roles in the management of patients with advanced PCa, there is limited information regarding their role in the context of skeletal complications. The current study investigated these relationships among newly diagnosed metastatic patients with PCa.

Methods and materials: This retrospective cohort study used Surveillance, Epidemiology and End Results cancer registry data for incident stage IV metastatic (M1) cases diagnosed from 2000 to 2007 with linked Medicare claims. Postdiagnosis urologist and medical oncologist visits were identified using billing codes. We considered skeletal-related events (SREs) that occurred after the urologist or medical oncologist visit. We used Cox proportional hazards models to examine the relationship between a physician visit and the timing of the first SRE with and without propensity-score matching to account for observable selection.

Results: The sample included 5,572 patients with stage IV M1 prostate cancer. Seventy-six percent of the patients were non-Hispanic White, 16% were non-Hispanic African American, and 8% were of other races; 75% of patients saw a urologist (median time to first visit = 19 days) and 44% saw an oncologist (median = 80 days), whereas 41% experienced at least one SRE (median = 309 days). Covariate-adjusted Cox models showed a longer time to an SRE for patients with only a medical oncologist visit (hazard ratio [HR] = 0.53, 95% CI: 0.45–0.61), only a urologist visit (HR = 0.35, 95% CI: 0.31–0.39) or both a urologist and medical oncologist visit (HR = 0.34, 95% CI: 0.31–0.38), compared to individuals without these visits. Among men with a urologist visit, a medical oncologist visit was not associated with the time to the first SRE (HR = 0.97, 95% CI: 0.90–1.05). Among those without a urologist visit a medical oncologist visit was associated with a longer time to an SRE (HR = 0.54, 95% CI: 0.46–0.64). Results were comparable using propensity-score matched samples.

Conclusion: Among men newly diagnosed with metastatic PCa, 4 of 10 patients experienced an SRE. Patients experienced a delay in skeletal complications when managed by a urologist or a medical oncologist compared to patients who did not see either specialist.

Keywords: Prostate cancer; Urologist; Medical oncologist; Skeletal-related events

1. Introduction

Excluding skin cancer, prostate cancer (PCa) is the most common cancer affecting men in the United States [1]. The American Cancer Society has projected an incidence of approximately 161,360 cases of PCa in 2017 [1]. Overall 68% of the patients who die of PCa were shown to have metastasis to the bone [2]. Additionally, the 1- and 5-year survival rates of patients with PCa drop significantly in the

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presence of bone metastasis [3]. Bone metastasis predisposes patients to skeletal complications collectively termed skeletal-related events (SREs) [4,5]. SREs include pathological fracture, bone surgery (BS), radiation therapy to the bone, and spinal cord compression (SCC). These events significantly impact patients with PCa in terms of economic burden, morbidity, reduced quality of life, and reduced survival [4–10]. Therefore, SREs have become increasingly important as outcomes that are evaluated in the management of PCa [11,12]. Clinical trials evaluating metastatic PCa treatments have examined the prevalence of SREs as a study outcome [13–16]. Time to SRE has been assessed as a primary endpoint in clinical trials of metastatic castrate-resistant [16,17] and castrate-sensitive PCa [18]. Time to SRE has also been assessed as a secondary endpoint in clinical trials of advanced PCa [12,13,18,19].

There is limited work detailing how physician visits may effect both the prevalence and the timing of SREs. Specialist visits significantly influence the types of treatment regimens patients receive [19]. A study that evaluated physician preferences for selecting bone-targeting agents found that delaying SREs was a key consideration for the physicians when selecting a treatment regimen [20]. Therefore, understanding the prevalence and timing of SREs in the context of physician visits becomes particularly relevant to improving the care of advanced cancer patients with skeletal metastasis. We focused on the physician specialists generally most responsible for the management of men diagnosed with metastatic PCa, that is, the urologist and the medical oncologist. To our knowledge, this is the first study to investigate the relationship between physician visits and the time to SRE among men diagnosed with incident metastatic PCa and at risk for skeletal complications.

2. Methods

The National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) database was used to obtain information on PCa incidence and stage at diagnosis between 2000 and 2009. SEER provides cancer surveillance data from 20 geographic areas covering around 28% of the U.S. population [21]. The data collected by the SEER registry includes demographic characteristics, tumor site, diagnosis date, and cancer stage at diagnosis. Information on Medicare enrollees' usage of health services before and after their diagnosis with cancer was available from linked SEER and Medicare (enrollment and claims) data. The claims data available for this study covered the 1999 to 2010 time period for the included cases.

The study sample consisted of men older than 65 years who were diagnosed with incident stage IV metastatic (M1) PCa and had continuous enrollment in Medicare Parts A and B in the 12 months before PCa diagnosis to calculate baseline measures of comorbidity status. Patients were excluded if they were enrolled in a health maintenance organization during the 12 months preceding the cancer diagnosis because their claims were incomplete. Also, patients were excluded if they had a history of cancer within the 5 years preceding PCa diagnosis, if their diagnosis month or year was unknown, or if they received a postmortem PCa diagnosis. Patients with an SRE claim before the PCa diagnosis were excluded since we were interested in SREs that occurred subsequent to diagnosis. Lastly, we excluded patients with survival less than 60 days after PCa diagnosis as early death might have modified their likelihood of receiving an SRE diagnosis. The follow-up period ended on December 31, 2010, or earlier (whichever occurred first) if patients enrolled in a health maintenance organization, lost Medicare Parts A and B coverage or died during this time period.

Postdiagnosis SREs were identified using Medicare claims, including the International Classification of Diseases 9th version Clinical Modification and the Healthcare Common Procedure Coding System that indicated SCC, pathological fracture, BS, or RAD. We used a definition of SREs that has been used in the published literature [22] and is presented as Appendix Table 1. This definition emphasized specificity, that is, we used codes for radiation therapy, pathological fracture, BS, and SCC that were highly likely to identify SREs but which, as a result of the narrower focus, could potentially result in underestimating SREs. Physician visits that occurred following the incident stage IV M1 PCa diagnosis were identified using National Claims History (NCH) and self-reported Health Care Financing Administration (HCFA) specialty codes, also known as CMS (i.e., Centers for Medicare and Medicaid Services) specialty codes. The codes are presented here as Appendix Table 2. Physician visits of interest included medical oncologist and urologist visits. As a way to further characterize the sample, we examined receipt of the following cancer-directed treatments: androgen deprivation therapy (ADT), radiation therapy, radiopharmaceuticals, and bisphosphonates using definitions from a prior study [22].

2.1. Statistical analysis

Continuous variables were compared using the Wilcoxon rank-sum test. Categorical variables were compared using chi-square tests. The following baseline variables were included in the regression models to control for the potential confounding role of demographic, clinical, and contextual factors: age at diagnosis, race/ethnicity, marital status, comorbid conditions defined by the Charlson Comorbidity Index, single indicators for prevalent comorbidities (i.e., congestive heart failure, chronic obstructive pulmonary disease, and diabetes), a single indicator for receipt of preventive services (including cancer screening, flu shot, and bone mineral density test or preventive care physician visit), a single proxy measure for poor performance status (any use of wheelchair, walking aid, oxygen, skilled nursing