# Effect of Practice Integration Between Urologists and Radiation Oncologists on Prostate Cancer Treatment Patterns

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**Purpose:** National attention has focused on whether urology-radiation oncology practice integration, known as integrated prostate cancer centers, contributes to the use of intensity modulated radiation therapy, a common and expensive prostate cancer treatment.

**Materials and Methods:** We examined prostate cancer treatment patterns before and after conversion of a urology practice to an integrated prostate cancer center in July 2006. Using the SEER (Statistics, Epidemiology and End Results)-Medicare database, we identified patients 65 years old or older in 1 statewide registry diagnosed with nonmetastatic prostate cancer between 2004 and 2007. We classified patients into 3 groups, including 1—those seen by integrated prostate cancer center physicians (exposure group), 2—those living in the same hospital referral region who were not seen by integrated prostate cancer center physicians (hospital referral region control group) and 3—those living elsewhere in the state (state control group). We compared changes in treatment among the 3 groups, adjusting for patient, clinical and socioeconomic factors.

**Results:** Compared with the 8.1 ppt increase in adjusted intensity modulated radiation therapy use in the state control group, the use of this therapy increased 20.3 ppts (95% CI 13.4, 27.1) in the integrated prostate cancer center group and 19.2 ppts (95% CI 9.6, 28.9) in the hospital referral region control group. Androgen deprivation therapy, for which Medicare reimbursement decreased sharply, similarly decreased in integrated prostate cancer center and hospital referral region controls. Prostatectomy decreased significantly in the integrated prostate cancer center group.

**Conclusions:** Coincident with the conversion of a urology group practice to an integrated prostate cancer center, we observed an increase in intensity modulated radiation therapy and a decrease in androgen deprivation therapy in patients seen by integrated prostate cancer center physicians and those seen in the surrounding health care market that were not observed in the remainder of the state.

**Key Words:** prostate; prostatic neoplasms; physician's practice patterns; radiotherapy, intensity-modulated; delivery of health care, integrated

**Abbreviations and Acronyms**

ADT = androgen deprivation therapy

HRR = health referral region

IMRT = intensity modulated RT

IPCC = integrated prostate cancer centers

ppt = percentage point

RT = radiotherapy

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PROSTATE cancer costs exceed $12 billion annually and account for almost 10% of the total cost of cancer care to Medicare.[1,2] Rapid adoption of new, expensive medical technology for prostate treatment has been an important cost

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driver.[3,4] Medicare reimbursement for IMRT, which was introduced in the late 1990s and is now the most common RT for prostate cancer, costs approximately $25,000 per treatment course compared to $8,000 to $13,000 for prostatectomy and $12,000 for brachytherapy.[5,6]

National attention recently focused on the contribution of IPCCs to IMRT use.[7–12] IPCCs form when urology practices acquire RT equipment and employ radiation oncologists, consolidating the provision of prostatectomy and IMRT in a single group practice, as allowed under the In-Office Ancillary Services Exemption of the Stark Law.[13] The Stark Law prohibits physicians from referring patients to a facility with which they have a financial relationship, while the In-Office Ancillary Services Exemption permits referrals when physicians maintain care oversight of the service in their office setting.

Integrated care may improve quality through better coordination of specialized multidisciplinary cancer treatment. However, ownership of highly reimbursed medical services by referring physicians has been shown to increase the use and costs of medical care.[14,15] Moreover, companies that sell turnkey IMRT programs to urology practices explicitly market the potential for increased IMRT revenue to replace lost earnings from ADT, for which reimbursement decreased sharply as part of the 2003 Medicare Modernization Act.[7,16]

To evaluate the influence of urology-radiation oncology practice integration on prostate cancer treatment patterns, we investigated the impact of the conversion of a urology practice to an IPCC in June 2006 on prostate cancer treatment patterns.

## METHODS

We identified the month and year of the conversion of a urology practice to an IPCC based on publicly available sources. The group practice is a large provider of urological services in its HRR. HRRs represent regional health care markets for tertiary medical care.[17] The practice opened a new RT center as part of the IPCC, extending the total market capacity for RT. Other RT providers in the HRR include a university based center and 2 community cancer centers. To comply with SEER-Medicare confidentiality guidelines, we redacted identifying information about the IPCC, the HRR in which the IPCC was located and the state.

Using statewide cancer registry and administrative claims data from the SEER-Medicare database, we defined preconversion and postconversion periods. Each comprised 18 months for case ascertainment from a statewide SEER registry and 9 months of followup for treatment ascertainment from Medicare claims, an interval that allowed sufficient time for multidisciplinary consultation and treatment initiation. No other IPCCs were formed in the state during the study period.

We identified men 65 years old or older with nonmetastatic prostate cancer diagnosed from March 1, 2004 to August 31, 2005 with followup through May 31, 2006 (preconversion period, 2,076 men) and from July 1, 2006 to December 31, 2007 with followup through September 31, 2008 (postconversion period, 1,904 men).

We identified urology and radiation oncology physician members of the IPCC and obtained their UPINs (Unique Physician Identifier Number) and NPIs (National Provider Identifier) from MPIER (Medicare Physician Identification and Eligibility Record). We examined physician visits based on Medicare claims occurring between the diagnosis and treatment dates (or 9 months after diagnosis). We then classified patients into 3 groups, including 1—those seen by IPCC physicians (exposure group), of whom 97% resided in the HRR, 2—those living in the same HRR who were not seen by IPCC physicians (HRR controls) and 3—those living elsewhere in the state (remaining state controls). By comparing changes in treatment use among these 3 groups, we could distinguish the impact of practice integration on patients seen by physician members of the IPCC vs patients seen by other physicians in the same regional health care market from secular trends elsewhere in the state.

The primary outcome was a categorical measure of prostate cancer treatments. Based on Medicare billing codes for each therapy, treatment was defined as the most aggressive therapy first delivered within 9 months after diagnosis. This was classified into 5 categories, including 1—prostatectomy, including open and robot-assisted laparoscopic radical prostatectomy, which were available to patients in each of the 3 groups, 2—IMRT, 3—other RT, referred to as other RT, including brachytherapy and conformal RT, 4—ADT or 5—expectant management if no Medicare codes for definitive treatment were found.[15] We calculated the proportion of patients receiving treatment in each of the 3 groups in the preconversion and postconversion periods.

We compared changes in the proportion of patients receiving treatments across the 3 patient groups in a differences in differences quasi-experimental framework. The unit of analysis was the patient. We estimated a multinomial logit model of patient treatment as a function of period, patient group and their interaction, adjusting for patient age, race, marital status, SEER-modified NCCN (National Comprehensive Cancer Network®) risk group (incorporating Gleason sum, pretreatment prostate specific antigen and tumor stage),[18] comorbidity in the 12 months before diagnosis[19] and census tract median household income. Because IMRT, prostatectomy and other active treatments should be reserved for men with 10 years or more of life expectancy,[20] we also evaluated treatment patterns in subgroups based on age 65 to 74 and 75 years or greater.

To enhance interpretability, we converted model output to the probability scale by calculating average partial effects.[21] For each binary indicator for period, patient group and their interactions, and for each of the 5 treatments separately we used the estimated coefficients to compute the difference between the predicted probabilities of each patient receiving that treatment when the covariate took the value 0 and when the covariate took the