VALUE IN HEALTH 15 (2012) 367–375

Available online at www.sciencedirect.com

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Comparative Effectiveness Research/Health Technology Assessment

Comparative Effectiveness, Cost, and Utilization of Radical Prostatectomy among Young Men within Managed Care Insurance Plans

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A B S T R A C T

Background: Costs and benefits of emerging prostate cancer treatments for young men (age < 65 years) in the United States are not well understood. We compared utilization, clinical outcomes, and costs between two types of radical prostatectomy (RP)—minimally invasive prostatectomy (MIRP) and retropubic prostatectomy (RRP)—among young patients. **Methods:** We extracted from LifeLink Health Plan Claims Database, a commercial claims database, information on 10,669 patients receiving either MIRP or RRP between 2003 and 2007. In unadjusted analyses, we used chi-square tests to compare clinical outcomes and nonparametric bootstrapping method to compare costs between the MIRP and RRP groups. We applied logistic, Cox proportional hazard, and extended estimation equation methods to examine the association between surgical modality and perioperative complications, anastomotic stricture, and costs while controlling for age, comorbidity, and health plan characteristics. **Results:** The percentage of prostatectomies performed as MIRP increased from 5.7% in 2003 to 50.3% in 2007. Patients with more comorbidity were more likely to undergo RRP than MIRP. Compared with the RRP group, the MIRP group had a significantly lower rate of perioperative complications (23.0% vs. 30.4%; $P < 0.001$) and a lesser tendency for anastomotic strictures (hazard ratio 0.42; 95% CI 0.35–0.50) within the first postoperative year but had higher hospitalization costs ($19,998 vs. $18,424; $P < 0.001$) despite shorter hospitalizations (1.7 days vs. 3.1 days; $P < 0.001$). Similar findings were reported in the subgroup analysis of patients with comorbidity score 0. **Conclusion:** MIRP among nonelderly patients increased substantially over time. MIRP was found to have fewer complications. Lower costs of complications appeared to have offset higher hospitalization costs of MIRP.

Keywords: cancer, claims databases, cost analysis, managed care, minimally invasive surgeries.

Introduction

The decision of a patient with prostate cancer to pursue radical prostatectomy (RP), radiation therapy, or active surveillance constitutes a complex interplay of the preferences and risk tolerance of the patient and his physician. The treatment strategy is further complicated by the paucity of scientific information with which to compare a growing list of emerging surgical options. Better treatment guidelines have been hampered by a lack of randomized clinical trials or incomplete prospective comparative trials. Nonstandardized metrics of treatment response and quality-of-life outcomes across studies have further muddled the decision-making process. This uncertainty among providers and consumers has catalyzed marked variability in prostate cancer treatments across the country.

Given the lack of randomized controlled trials to provide definitive answers for this most commonly diagnosed cancer in males [1], costs associated with various treatment options are likely to become increasingly important in the decision-making process. More than 75,000 prostatectomies are performed annually in the United States [2]. The estimated cost for the first 6 months of prostate cancer treatment is in the range of $13,000 to $17,000 (2002 US dollars) for elderly patients treated with RP [2,3]. Since that time, a number of emerging technologies have been introduced. Minimally invasive RP (MIRP), such as robotic-assisted or standard laparoscopic RP, has become one of the most popular forms of primary prostate cancer therapy.

Between 2003 and 2005, the proportion of Medicare beneficiaries with newly diagnosed prostate cancer who underwent MIRP increased from 12.2% to 31.4% among those who received RP whereas patients undergoing retropubic RP (RRP) declined from 82% to 66.1% [4]. A similar trend has also been reported in studies including prostate cancer patients of all ages [5,6]. No study, however, has focused exclusively on patients younger than 65 years. This age group is of special importance, as an

Conflicts of interest: The authors have no conflicts of interest to report.

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doi:10.1016/j.jval.2011.10.008

Table 1 – ICD-9 and CPT codes to identify perioperative complications and stricture from claims.

Complication	ICD-9 diagnosis codes	ICD-9 procedure codes	CPT/HCPCS codes
Cardiac	410.X, 402.01, 402.11, 402.91, 428.X, 427.5, 997.1	NA	NA
Respiratory	518.0, 514, 518.4, 466.X, 480.X, 481, 482.X, 483.X, 485, 486, 518.5, 518.81, 518.82, 799.1, 997.3	NA	NA
Vascular	415.1, 451.1X, 451.2, 451.81, 451.9, 453.8, 453.9, 997.2, 999.2, 444.22, 444.81, 433.X, 434.X, 436, 437.X	NA	NA
Wound or bleeding	567.X, 998.3, 998.5X, 998.6	54.61, 54.91, 54.0, 54.19, 59.19	26990, 45020, 49060, 51080
Genitourinary	595.89, 590.1X, 590.2, 590.8X, 590.9, 591, 997.5, 596.1, 596.2, 596.6, 593.3, 593.4, 593.5, 593.81, 593.82	55.02, 55.03, 55.12, 55.93, 55.94, 59.93, 97.61, 97.62, 56.1, 56.41, 56.74, 56.75, 56.81, 56.84, 56.86, 56.89, 56.91	50040, 50120, 50125, 50395, 50398, 50605, 52290, 52332, 52334, 50600, 50700, 50715, 50760, 50770, 50780, 50782, 50783, 50785, 50800, 50810, 50815, 50820, 50825, 50840, 50900, 50940
Miscellaneous medical	584.X, 586, 785.5X, 995.0, 995.4, 998.0, 999.4, 999.5, 999.6, 999.7, 999.8, 457.8, 560.1, 560.8X, 560.9, 997.4, 353.0, 354.2, 723.4, 955.1, 955.3, 955.7, 955.8, 955.9, 593.4, 531.1, 531.2, 531.3, 531.4, 531.5, 531.6, 531.9, 532.1, 532.2, 532.3, 532.4, 532.5, 532.6, 532.9, 533.1, 533.2, 533.3, 533.4, 533.5, 533.6, 533.9, 782.4, 573.8	NA	NA
Miscellaneous surgical	599.1, 596.1, 596.2, 596.6, 565.1, 569.3, 569.83, 569.4, 569.4X, 998.1X, 998.83, 998.9, 998.2, 998.4, 998.7, 604.0, E870.0, E870.4, E870.7, E870.8, E870.9, E871.0, E873.0, E876.0, 956.0, 956.1, 956.4, 956.5, 956.8, 956.9, 902.50, 902.51, 902.52, 902.53, 902.54, 902.59	46.03, 46.04, 46.10, 46.11, 46.14, 48.4X, 48.5, 48.6X, 48.7X, 48.9X	
Anastomotic stricture	596.0, 598.0, 598.1, 598.2, 598.8, 598.9	57.0, 57.1X (except 57.11), 57.2X, 57.92, 58.6, 57.4X, 57.85, 57.91, 58.0, 58.1, 58.3X, 58.44, 58.5	51010, 51040, 52510, 52281, 52283, 53600, 53601, 53605, 53620, 53621, 53640, 51800, 51820, 52275, 52276, 52310, 52500, 52620, 52640, 53000, 53010, 53020, 53400, 53405, 53410, 53415, 35420, 53425

CPT, common procedural terminology; HCPCS, healthcare common procedural coding system; ICD-9 International Classification of Diseases 9; NA, not applicable.

earlier study showed that despite a decline in RP among elderly patients, surgical treatment continued to increase among younger patients [7]. In addition, no population-based study has explored the impact of MIRP on the cost of prostate cancer care.

The objectives of this study are: 1) to understand the utilization patterns of the two most commonly used surgical approaches to RP—MIRP and RRP—from 2003 to 2007 among a cohort of young men (age < 65 years) with prostate cancer and enrolled in managed care plans; and 2) to compare the differences in outcomes and costs between patients treated with MIRP and those with RRP.

Methods

Study population and identification of RP modalities

By using the LifeLink Health Plan Claims Database, a proprietary claims data, we identified men 18 years and older and younger than 65 years who underwent RP from 2003 to 2007. The database represents approximately 55 million individuals from more than 95 managed care plans throughout the United States and contains information on enrollment records and on medical and prescription drug claims. All claims data can be linked to enrollment records via de-identified person identifiers. The institutional review board of the University of Texas MD Anderson Cancer Center exempted this study for approval.

We classified patients into different RP groups by using Current Procedural Terminology (CPT) codes: patients with prostate cancer with CPT codes 55840, 55842, and 55845 were classified as the RRP group, whereas those with CPT code 55866 were classified as the MIRP group. It should be noted that the CPT code for MIRP did not differentiate between laparoscopic and robotic RPs, and thus our data would not allow further stratification of the MIRP procedures. All patients were required to be continuously enrolled in the same health plan for at least 9 months, covering 6 months before RP (for calculating comorbidity score) and 3 months afterward (for tracking perioperative complications). The selection of a 3-month follow-up period was to facilitate comparisons of perioperative complications with a published study using the Medicare data to compare MIRP and RRP among the elderly patients [4].

Outcome measures

We compared perioperative complications, anastomotic strictures, and length of stays between patients in the MIRP and RRP