The Comparative Effectiveness and Cost-Effectiveness of Brachytherapy in Prostate Cancer

EXECUTIVE SUMMARY

Prostate cancer is the second most frequently diagnosed cancer and the second most common cause of death from cancer in American men. Because there are a number of effective treatments for prostate cancer, the long term comparative effectiveness and cost-effectiveness of the alternatives should inform treatment selection.

In a careful examination of the peer-reviewed literature, brachytherapy emerges as the most cost-effective treatment for low- to intermediate-risk prostate cancer, providing superior or equivalent effectiveness at lower overall direct costs to the healthcare payer as well as lower indirect costs (e.g., productivity loss) to the patient. Brachytherapy’s lower overall direct and indirect costs are due to its low adverse effect rates and to its convenient, typically one-time, outpatient-based administration.

In light of this evidence, one would expect the use of brachytherapy to be increasing; in fact, the opposite is true. Brachytherapy utilization is declining, while surgical alternatives, including robotic-assisted radical prostatectomy, are experiencing an increase in utilization. If we are to meet the stated triple aims of improving the experience of care, improving the health of populations, and reducing per capita costs of health care within the prostate cancer population, measures that promote the use of brachytherapy will support these goals.
INTRODUCTION

The prostate is a walnut-shaped gland in the male reproductive system that produces fluid for sexual reproduction. It is located below the bladder and surrounds part of the urethra. Prostate cancer occurs when cells in the prostate become abnormal and grow uncontrollably. These multiplying cells may form a tumor within the gland and/or may metastasize. Cancer confined to the prostate gland is considered clinically localized disease.

The burden of prostate cancer in the United States is significant. Aside from skin cancer, prostate cancer is the most frequently diagnosed cancer in men. In 2015, the American Cancer Society estimates about 220,800 new cases of prostate cancer will occur in the US. The only well-established risk factors for prostate cancer are increasing age, African ancestry, a family history of the disease, and certain inherited genetic conditions. While it is often thought that prostate cancer is an elderly man’s disease, approximately 44% of prostate cancer is diagnosed in men under the age of 65.1

Prostate cancer is also the second most common cause of death from cancer in American men, with an estimated 27,540 deaths expected in 2015. However, prostate cancer death rates have been decreasing since the early 1990s and have decreased by 3.2% per year from 2007 to 2011. Furthermore, the statistics regarding early stage detection and survival are encouraging. Approximately 93% of prostate cancers are diagnosed in the local or regional stages, for which the 5-year relative survival rate approaches 100%. In fact, over the past 25 years, the 5-year relative survival rate for all stages combined has increased from 68% to almost 100%; currently, 10- and 15-year relative survival rates are 98% and 94%, respectively.1

Prostate Cancer Treatment Options

At diagnosis, prostate cancer stage, grade, and prostate-specific antigen (PSA) measures determine the patient’s risk group: low, intermediate, or high. Treatment options vary depending on the patient’s risk group as well as patient characteristics such as age, other medical conditions, and personal preferences. For example, more than half (52%) of men aged 64 or younger are treated initially with radical prostatectomy, whereas radiation therapy is the most common initial treatment for 65- to 74-year-old men (38%). For most men age 75 and older, however, watchful waiting or active surveillance is the initial treatment strategy of choice.2

Because 93% of prostate cancers are diagnosed in early stages, the current analysis focuses on commonly utilized surgical and radiation-based treatments for low- to intermediate-risk, localized prostate cancer. As described in Table 1, treatment options include watchful waiting, active surveillance, surgery, and several radiation-based therapies.

Because early stage diagnosis and survival rates are high, and because there are a myriad of effective treatments, it is crucial to make informed treatment selections based on: comparative risk-benefit profiles; short- and longer-term cost comparisons; and cost-effectiveness comparisons utilizing combined measures incorporating information regarding survival, quality of survival, and costs of care.3
Table 1. Common Prostate Cancer Treatment Options

<table>
<thead>
<tr>
<th>Treatment Type</th>
<th>Description</th>
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<tr>
<td><strong>Watchful Waiting</strong></td>
<td>With watchful waiting men are observed without monitoring and given palliative treatment when the disease becomes symptomatic.</td>
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<td><strong>Active Surveillance</strong></td>
<td>With active surveillance men are followed closely – typically with serial prostate-specific antigen (PSA) tests, digital rectal examinations, and biopsies – and treated with curative intent if the disease progresses.</td>
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<td><strong>Radical Prostatectomy</strong></td>
<td>Radical prostatectomy is the complete surgical removal of the prostate gland along with seminal vesicles, ampulla of vas, and sometimes pelvic lymph nodes.</td>
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<td>• Radical prostatectomy procedures may be open, laparoscopic or robotic but laparoscopic and robotic procedures are more frequently performed.</td>
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<td><strong>Brachytherapy</strong></td>
<td>Unlike most radiation treatments, brachytherapy offers treatment from the inside out utilizing radioactive seeds placed directly into the prostate gland.</td>
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<td>• For low-risk and many intermediate-risk prostate cancer, brachytherapy is often used as monotherapy.</td>
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<td>• Brachytherapy can also be used in a variety of combination therapies, although this is typical only for treatment of intermediate to high-risk prostate cancer.</td>
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<tr>
<td><strong>Low Dose Rate (LDR) Brachytherapy</strong></td>
<td>LDR brachytherapy involves a one-time procedure of permanent interstitial placement of radioactive seeds into the prostate gland.</td>
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<td>• LDR brachytherapy is the more frequently used form of brachytherapy for prostate cancer.</td>
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<td><strong>High Dose Rate (HDR) Brachytherapy</strong></td>
<td>HDR brachytherapy uses a higher strength radioactive source contained within an afterloader device.</td>
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<td>• The afterloader delivers the source for a non-permanent, brief period of time to catheters, needles, or other devices placed in the tumor site.</td>
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<td>• HDR brachytherapy is typically performed in 2 - 4 fractions (i.e. treatment periods).</td>
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<td></td>
<td>• HDR brachytherapy is utilized primarily in intermediate to high-risk prostate cancer.</td>
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<td><strong>External Beam Radiation Therapy</strong></td>
<td>External Beam Radiation Therapy (EBRT) uses a machine external to the body to aim high-energy rays at cancer cells. Common forms of EBRT include 3D Conformal Radiotherapy (3DCRT) and Intensity Modulated Radiation Therapy (IMRT). IMRT is detailed below.</td>
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<td>• EBRT is typically performed in an outpatient center 5 days per week for 7 – 9 weeks.</td>
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<td><strong>Intensity Modulated Radiation Therapy</strong></td>
<td>Intensity Modulated Radiation Therapy (IMRT), a type of EBRT, is an alternative to 3DCRT for ultra-high dose radiation treatment, which involves the external delivery of multiple beams of radiation conforming to the shape of the tumor.</td>
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<td>• IMRT is delivered in 35-38 fractions over 7 – 8 weeks.</td>
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<td><strong>Stereotactic Radiosurgery</strong></td>
<td>Stereotactic Radiosurgery sometimes called Stereotactic Body Radiation Therapy (SBRT) or extreme hypofractionation, uses image-guided radiation therapy to treat tumors.</td>
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<td>• Patients may receive between 1 - 5 treatment sessions.</td>
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<tr>
<td><strong>Proton Beam Therapy</strong></td>
<td>Proton Beam Therapy is another type of radiation therapy that uses streams of protons (tiny particles with a positive charge) to kill tumor cells.</td>
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<td>• Proton beam therapy is delivered in ~40 fractions (i.e. individual treatment periods).</td>
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OBJECTIVE

To determine the comparative effectiveness and cost-effectiveness of brachytherapy as compared to surgery and to other radiation-based prostate cancer treatments.

METHODS

A literature search was conducted to identify published evidence of the effectiveness, costs, and cost-effectiveness associated with surgical and radiation-based treatments for low-risk, localized prostate cancer. The search was limited to U.S. original studies and review articles comparing multiple prostate cancer treatment options (necessarily inclusive of brachytherapy). We thus excluded any case series reports or other single-arm prospective or retrospective studies. We also excluded studies of combination therapies, as they are used infrequently in low-risk, localized prostate cancer and because the contribution of individual treatments to a combination therapy’s effectiveness and cost-effectiveness cannot be ascertained.

With respect to comparative effectiveness (not cost or cost-effectiveness) studies, we determined that all original studies meeting our pre-established criteria were included in the comprehensive literature review conducted by the Prostate Cancer Results Study Group. Similarly, the only comparative cost (and not cost-effectiveness) study we identified which met our search criteria was the 2006 comparison of healthcare utilization and cost patterns as identified in the Cancer of the Prostate Strategic Urologic Research Endeavor (CaPSURE) national disease registry. We identified initially eight comparative cost-effectiveness studies, but only four of these included brachytherapy as a treatment comparator.

RESULTS

Definitions

In the papers identified, effectiveness of prostate cancer treatment is measured in terms of survival (in years), prostate-specific antigen (PSA) progression-free survival; relapse-free survival; quality-adjusted survival [in quality-adjusted life years (QALYs) or in quality-adjusted life expectancy (QALE)], and recurrence rates.

To understand the effectiveness measures used, it’s important to understand that QALYs or QALE are calculated based on assessments of health utility, where health utility essentially measures the quality of a patient’s life on a scale that ranges from 0 (death) to 1 (perfect health). QALY measurements are an attempt to balance the impact of treatment on quality of life as well as on survival. For prostate cancer patients, the impact of treatment on their health utility is assessed by examining the short- and long-term impact of treatment on bowel, urinary, and sexual functioning as well as on overall health-related quality of life (HRQOL). A patient experiencing significant, deleterious side effects due to treatment will thus have lower overall health utility than a patient who experiences only mild treatment side effects. Once health utility has been ascertained, QALYs are calculated by multiplying survival (in years) by health utility (over the years of survival). For example, a patient in perfect health who experiences one year of survival also experiences one QALY, whereas a patient with a health utility of 0.5 who also experiences one year of survival will experience only 0.5 QALYs. Higher QALYs, as compared to lower QALYs, denote improved treatment effectiveness (according to this combined measure of survival and HRQOL).
Comparative Effectiveness Summary

The Prostate Cancer Results Study Group (PCRSG) conducted a comprehensive literature review to compare all long-term studies involving treatment of localized prostate cancer published between 2000 and 2010. Over 18,000 papers were identified. The PCRSG focused their review based on key criteria (i.e., 5-year follow-up; stratification by risk group; clinical and pathological staging; standard definitions for PSA failure; and minimum patient numbers) to arrive at a total of 134 studies across low-, intermediate, and high-risk patients and inclusive of both monotherapies and combination therapies.

For our purposes, we examined the 39 studies of patients with localized, low-risk prostate cancer. Of these studies, two involved HDR brachytherapy, 17 involved LDR brachytherapy, two were of proton beam therapy, nine were of EBRT alone; seven described radical prostatectomy (including one robotic); one studied brachytherapy + EBRT; and one included high intensity focused ultrasound (HIFU), another less commonly utilized prostate cancer treatment. The PCRSG determined that in terms of long-term (> 5 years) biochemical (PSA) progression-free survival or cancer control, brachytherapy provides superior outcomes as compared to all other treatment alternatives in patients with low-risk disease.

Comparative Cost Summary

Wilson et al. (2007) performed a 10-year longitudinal analysis of newly diagnosed prostate cancer patients from 1995 to 2004 utilizing the CaPSURE national disease registry. The CaPSURE registry includes both ongoing clinical data collection and biennial patient-reported outcome questionnaires. Gathered data pertinent to cost analysis included cost data related to initial treatment and subsequent cancer related interventions after primary treatment.

Patients were selected for the analysis if they enrolled in the CaPSURE database within 6 months of diagnosis, had a primary treatment record, and submitted at least one medical resource utilization (MRU) questionnaire; the selection criteria resulted in a sample of 4,553 patients who had completed a median of 5 MRU surveys. The mean interval of observation was 5.5 years with data analysis projected at 10 years. Only prostate cancer-related utilization as determined by clinicians was included by Wilson et al. in their analysis. Prostate cancer-related utilization included, the costs of treating adverse effects of prostate cancer treatment. Costs (not charges) were obtained from national, publicly available sources and were adjusted to 2004 US dollars.

Initial treatments included radical prostatectomy, EBRT, brachytherapy, watchful waiting, and the less commonly utilized androgen deprivation therapy (ADT). Cumulative costs at ten years for men across all risk groups were highest for ADT ($69,244), followed by EBRT ($59,455), radical prostatectomy ($36,888), brachytherapy ($35,143), and watchful waiting ($32,135). For low-risk prostate cancer only, EBRT has the highest cost ($48,840) and brachytherapy the lowest cost ($28,366), even as compared to the strategy of watchful waiting ($31,871). Radical prostatectomy was again on the lower end of the spectrum for low-risk patients, with an average cumulative cost of $32,795.
Comparative Cost-Effectiveness Studies

Ollendorf et al. (2009)3

In this assessment for the Institute for Clinical and Economic Review (ICER), Ollendorf et al. reviewed the comparative clinical safety, clinical effectiveness, and comparative value of active surveillance, radical prostatectomy, brachytherapy, IMRT and proton beam therapy for men with clinically localized, low-risk prostate cancer.

Despite the challenges of comparing both short- and long-term complications associated with the different therapies, due to the lack of head-to-head clinical trials, the role of physician training and experience, and differences in the way patient-reported outcomes are measured, they do note a few general distinctions. For example, radiation therapy has a higher rate of short- and long-term bowel side effects as compared to radical prostatectomy, with IMRT having a higher rate than brachytherapy. Conversely, radical prostatectomy is associated with a higher risk of short-term urinary incontinence and sexual dysfunction as compared to radiation therapy. Long-term sexual dysfunction data are difficult to interpret across the various radical prostatectomy and radiation therapy studies.

There are no data available from randomized, controlled trials (RCTs) to compare directly the impact of radical prostatectomy, brachytherapy, IMRT, proton beam therapy and active surveillance on overall survival, disease-specific survival, or on biochemical progression-free survival. However, ICER notes that 5-year disease-specific survival for all management options largely overlap in a very tight range from 95-100%, although only two studies of IMRT reported this measure (both reporting 100% disease-specific survival at 5 years) and no studies of proton beam therapy provided this data outcome. Similarly, Ollendorf et al.,3 note that, within the limits of available evidence, no findings support a distinct difference in biochemical failure rates at 5 or 10 years across brachytherapy, IMRT, or radical prostatectomy.

Finally, the authors used their findings on clinical safety and effectiveness to inform a primary cost-effectiveness analysis of active surveillance, radical prostatectomy, brachytherapy, IMRT, or proton beam therapy in 65-year-old and 55-year-old men with clinically localized, low-risk prostate cancer. The authors noted that the evidence on proton beam therapy was not sufficient to determine whether it produces superior, comparable, or inferior outcomes relative to existing alternatives; however, it was included to provide a complete assessment of popular current and emerging treatment options. Costs of treatment options, complications and side effects were based on national Medicare payment rates for relevant services; the indirect costs of patient time associated with these services were also estimated using national wage rates.

In 65-year-old men, the model predicted that the active surveillance treatment strategy resulted in the highest mean QALYs (8.97) with radical prostatectomy resulting in the lowest QALYs (7.82). Of the three radiation therapies, brachytherapy had the highest expected QALYs (8.12), followed by IMRT (8.09) and proton beam therapy (7.97). Average lifetime costs (discounted and inclusive of costs of complications, side effects, and indirect costs of patient time) associated with each treatment type (from lowest to highest) were: brachytherapy ($25,484); radical prostatectomy ($28,348); active surveillance ($30,422); IMRT ($37,861) and proton beam therapy ($53,828). Combining these results, we find that brachytherapy is the most cost-effective strategy with an expected cost of $3,138 per QALY (as compared to $3,392/QALY for active surveillance; $3,625/QALY for radical prostatectomy; $4,680/QALY for IMRT; and $6,754 for proton beam therapy).

The modeled results in 55-year-old men were analogous. The highest expected QALYs were associated with active surveillance, with brachytherapy patients experiencing the next highest expected QALYs followed closely by IMRT, proton beam therapy, and radical prostatectomy. Average lifetime costs (discounted) were lowest for brachytherapy (at $29,137) and brachytherapy was again determined to be the most cost-effective strategy, with the lowest expected cost per QALY (at $2,718).
Hayes et al. (2013)

A lifetime, societal perspective decision analysis was developed by Hayes et al., to assess the costs and benefits of observation (watchful waiting or active surveillance) versus initial treatment (brachytherapy, IMRT, or radical prostatectomy) in men aged 65 and 75 years with newly diagnosed low-risk prostate cancer. Treatment effectiveness inputs were generated from a systematic literature review updated through June 2012; utilities for health states were elicited using a standard, validated methodology. Costs utilized in the model were measured in 2012 U.S. dollars and included inpatient and outpatient direct and indirect medical costs (inclusive of costs of complications and side effects) derived from the Centers for Medicare and Medicaid Services Hospital Outpatient Prospective Payment System. Patient time was valued at $165 per day, assuming an 8-hour workday at the 2012 U.S. median wage for men aged 65 years or older.

In both age groups, watchful waiting was shown to be the dominant strategy as compared to active surveillance and all active treatments; i.e., it resulted in the highest quality-adjusted life expectancy (QALE) at the lowest overall cost. Specifically, for men aged 65 years, watchful waiting was expected to result in 9.02 years of QALE at a total lifetime cost of $24,520. Active surveillance had the next highest QALE at 8.85 years, but at a substantially higher cost of $38,180. Results were analogous for men aged 75 years.

Among active treatments, brachytherapy was the dominant strategy in both age groups, with the lowest overall costs and the highest QALE. Specifically, for men aged 65 years, brachytherapy was expected to result in 8.14 years of QALE at a total cost of $35,374. While IMRT’s expected QALE was only slightly lower (8.10 years), the average lifetime costs of IMRT averaged $48,699. The costs associated with radical prostatectomy were in-between those of brachytherapy and IMRT at $38,180, but QALE associated with radical prostatectomy was lower (7.95 years) than for either of the radiation therapy treatments. Results were analogous for men aged 75 years.

Cooperberg et al. (2013)

Cooperberg et al., also describe their development of a decision analysis model to characterize the costs and outcomes associated with treatment alternatives for prostate cancer; however, their model differs from that of Hayes et al. (2013) in that it: (1) does not consider watchful waiting or active surveillance as treatment strategies; (2) assesses an alternative EBRT option (3DCRT) as well as combination therapies in addition to radical prostatectomy, brachytherapy, and IMRT; and (3) examines hypothetical men with low-, intermediate-, and high-risk prostate cancer.

Treatment safety and effectiveness inputs were generated from an exhaustive literature search yielding a final set of 232 unique publications from which data were selected; utilities for health states were determined from publications and the Cost-Effectiveness Analysis Registry and were validated by an expert panel. Costs utilized in the model were measured in 2009 U.S. dollars and were derived from the Fiscal Year 2009 National Medicare Fee Schedules and the 2009 Drug Topics Redbook. Unlike Hayes et al. (2013) and Ollendorf et al. (2009), capital and maintenance costs for equipment were not separately included. Time spent by patients in treatment and recovery was estimated by an expert panel and indirect costs were assessed by associating these times with wage losses based on 2008 Bureau of Labor Statistics hourly rates inflated by 2%.

The model developed by Cooperberg et al., arrives at distinctly different conclusions than the similarly constructed models developed by Hayes et al. (2012) and Ollendorf et al. (2009). Cooperberg et al., conclude that radical prostatectomy is a dominant strategy as compared to brachytherapy, 3DCRT, and IMRT; i.e., radical prostatectomy is expected to result in lower costs, increased survival, and increased QALYs. Specifically, for low-risk patients radical prostatectomy is expected to result in costs of approximately $20,000 (averaged across open, laparoscopic, and robotic radical prostatectomy costs) –
significantly less expensive than each of the radiation therapy methods: brachytherapy ($25,067); 3DCRT ($27,626); and IMRT ($37,718).

Additionally, across all effectiveness measures associated with treatments for low-risk patients, radical prostatectomy was associated with superior performance, resulting in significantly fewer prostate cancer deaths (at 2.7%), significantly longer survival (at 16.7 years) and significantly higher quality-adjusted survival (at 11.3 QALYs) as compared to all radiation therapy treatment options. Among the radiation therapy options, brachytherapy and IMRT were expected to result in identical outcomes, with 6.9% of deaths due to prostate cancer, 16.2 years of overall survival, and 10.8 QALYs.

In summary, brachytherapy was found by Cooperberg et al., to have the lowest costs of the three radiation therapies considered, but still significantly higher costs than radical prostatectomy. In terms of survival, quality-adjusted survival, and prostate cancer deaths, brachytherapy and IMRT were equivalent and significantly better than 3DCRT, but statistically inferior to radical prostatectomy.

**Shah et al. (2012)**

Shah et al., describes the results of an assessment of 1,328 low- or intermediate-risk prostate cancer patients treated with LDR brachytherapy (n = 207), HDR brachytherapy (n = 252), or IMRT (n = 869) between January 1992 and December 2008 at a single institution. For this analysis, patients receiving 3DCRT were excluded. The stated purpose of the study was to examine the clinical outcomes among the radiation therapy modalities and the cost-effectiveness of LDR brachytherapy, HDR brachytherapy, and IMRT in patients with low and intermediate-risk prostate cancer for both healthcare payers and institutions providing care.

Biochemical control (BC), cause-specific survival (CSS), and overall survival (OS) were assessed at 5 years post-treatment. The Medicare-perspective cost of each treatment was based on reimbursement using the hospital-based 2010 Medicare Ambulatory Payment Classification (APC) and Medicare Physician Fee Schedule reimbursement rates for both the technical and professional components. Unlike the other cost-effectiveness analyses reviewed, costs beyond the treatment procedures themselves (e.g., follow-up visits; PSA measurement; CT scans) and costs for management of side effects were not included. Additionally, indirect costs such as lost productivity costs were not included. The cost of treatment to the facility was calculated based on calculated costs to deliver each aspect of care [per Current Procedural Terminology (CPT®) code]. These costs include the space required to deliver treatment; equipment requirements; including LDR seeds and HDR source replacement; staffing requirements; service contracts; and technical services required.

Rates of BC, CSS, and OS were compared among all groups. At 5 years no statistically significant differences were seen in biochemical control (86.9% vs. 87.4% vs. 91.7%) for the LDR brachytherapy, HDR brachytherapy and IMRT cohorts. Similarly, no differences were noted in cause-specific survival (99.5% vs. 100% vs. 99.7%), although overall survival was significantly higher for HDR brachytherapy (98%) as compared to LDR brachytherapy (89.5%) and IMRT (87.2%). While clinical outcomes were similar across all treatment options, total reimbursement (costs to Medicare) differed significantly across the treatment groups, averaging $9,938, $17,514, and $29,356 for LDR brachytherapy, HDR brachytherapy, and IMRT. Similarly, facility costs ranged from $2,395 for LDR brachytherapy, $5,467 for HDR brachytherapy, and $23,665 for IMRT.
FOCUSED DISCUSSION OF RESULTS

While active surveillance and watchful waiting were identified as cost-effective treatment alternatives in the decision analyses developed by Ollendorf et al. (2009) and Hayes et al. (2013), most men aged 74 and younger receive an initial treatment with curative intent, even if they are low-risk patients. Because of this, it's important to understand the comparative effectiveness and comparative cost-effectiveness of the remaining surgical and radiation therapy treatment options commonly used today.

Interestingly, in five of the six studies including some assessment of treatment effectiveness – whether it was biochemical progression-free survival, cancer-related survival, overall survival, or quality-adjusted survival – brachytherapy was identified as having either superior or equivalent performance as compared to all other active treatment alternatives. Similarly, five of the six studies including some assessment of treatment costs identified brachytherapy as the least costly active treatment for low- to moderate-risk prostate cancer patients.

The outlier study, Cooperberg et al. (2012), identified radical prostatectomy as the dominant treatment strategy compared to brachytherapy, 3DCRT, and IMRT (i.e., the model predicted that radical prostatectomy would result in both significantly lower lifetime treatment costs and significantly better outcomes in terms of survival, quality-adjusted survival, and percentage of deaths due to prostate cancer). The cost discrepancy, at least, is easy to explain as Cooperberg et al., unlike Ollendorf et al. and Hayes et al., did not include capital and equipment costs in their assessment, an exclusion that would skew the results in favor of radical prostatectomy. Furthermore, the modeled effectiveness results of Cooperberg et al., are identical for IMRT and brachytherapy, which is inconsistent with expectations of other modeled results and also inconsistent with the retrospective assessment of Shah et al. (2012), the literature-based reviews of Ollendorf et al. and the long-term results of Grimm et al. (2012); these analyses all show similar, but not identical, effectiveness of IMRT and brachytherapy. Finally, in Hayes et al. and Ollendorf et al., modeled analyses attribute equivalent or even slightly better overall survival to radical prostatectomy but lower quality-adjusted survival (as compared to radiation therapies). Only Cooperberg et al., predicts superior survival and quality-adjusted survival of radical prostatectomy as compared to all other radiation treatment options. It is thus interesting to note that Cooperberg et al., was funded by a manufacturer of robotic surgical devices.

BROADER DISCUSSION AND CONCLUSIONS

The introduction over the last decade of new technologies such as robotic radical prostatectomy, IMRT and proton beam therapy for treating localized prostate cancer has led to increasingly complicated choices for physicians, payers, and patients. However, as has been emphasized here, brachytherapy has proven itself consistently as an effective and cost-effective treatment for patients with localized prostate cancer.

Recent treatment trends, however, do not correlate with these findings; brachytherapy utilization is decreasing. Martin et al. (2014) examined data for more than 1.5 million patients diagnosed with localized prostate cancer from 1998 through 2010. Overall, 13.4% were treated with brachytherapy, compared with 49.8% treated with radical prostatectomy, 26.3% with other forms of radiation, 24.1% with hormone therapy, and 7.8% with no treatment. Use of brachytherapy reached a peak of 17% of patients with localized prostate cancer in 2002, and then declined steadily to a low of 8% in 2010.

The substantial increase in the number of radical prostatectomy procedures should also be of concern to patients, payers, and other decision-makers. Despite the absence of level I evidence supporting a benefit over traditional open radical prostatectomy, robotic-assisted laparoscopic prostatectomy has been widely adopted across the U.S. Use of radical prostatectomy as a treatment strategy increased from 46% in 1998 to 59% in 2010, while use of other forms of radiotherapy remained unchanged.
Patient-focused considerations should also play a role when comparing treatment options. External radiation therapies all require numerous treatments, often on a daily basis, over a period of multiple weeks. For patients living in rural areas, who must drive long distances this can be a burden. Surgery and the associated post-operative recovery period have significant implications on lost work time, short-term productivity and quality of life. Brachytherapy, on the other hand, is typically a one-time treatment option that eliminates these additional patient concerns.

Finally, it should be noted that millions of newly insured males under the Affordable Care Act (ACA) would have a significant impact on payer costs associated with prostate cancer treatment. A recent analysis\(^\text{11}\) of the likely impact of implementation of the ACA estimates that payers will be responsible for an additional 70,110 cases of early prostate cancers over the next ten years and points to brachytherapy as a cost-effective treatment choice for these newly insured populations.

In fact, brachytherapy addresses each of the three stated aims of healthcare reform: Its convenient, one-time treatment offers benefits in terms of the patient experience of care; its effectiveness leads to improved population health; and its increased utilization would lower the per capita costs of care. Logic would suggest that brachytherapy utilization would be increasing to maximize the clinical and economic benefits of the treatment. As that is not the case, one must ask the question, “Why not?”

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REFERENCES


