Economic Evaluation of Treatment Strategies for Benign Prostatic Hyperplasia—Is Medical Therapy More Costly in the Long Run?

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Purpose: Although medical therapy for newly diagnosed benign prostatic hyperplasia is initially less expensive than surgery, to our knowledge the long-term costs of these treatments are unknown. We defined longer term costs of these treatment strategies.

Materials and Methods: We examined spending on benign prostatic hyperplasia related services by examining health care claims for a 5-year period subsequent to a new benign prostatic hyperplasia diagnosis. Expenditures for subjects treated initially with surgery were compared to expenditures for those with initial medical treatment. Expenditures were projected during longer periods and the net current value of these expenditures was calculated.

Results: Of the 970 subjects identified who received benign prostatic hyperplasia treatment 913 (94.1%) relied on medical therapy as initial treatment. Of those subjects 832 (91.1%) were on α-blockers. The secondary treatment rates for surgery far exceeded those for medical therapy (37% vs 8%). Average total expenditures were higher for subjects who initially received surgery ($12,699, 95% CI 9,865–15,533) than for those initially treated with medication ($2,193, 95% CI 1,959–2,428). If future streams of spending were discounted at standard rates (3%), the costs of initial medical therapy as a treatment strategy would always be lower than those of initial surgical therapy even at 40 years.

Conclusions: In a cohort of privately insured men with newly diagnosed benign prostatic hyperplasia monotherapy with α-blockers was the most common initial treatment. Surgical therapy was associated with higher treatment failure rates and higher costs during 5 years. Increased expenditures related to initial surgical therapy were consistent when projected over long time frames.

Key Words: prostate, prostatic hyperplasia, outcome assessment (health care), health expenditures

Before the advent of effective medical therapy surgery for BPH was the mainstay of treatment. However, α-adrenergic antagonist medications (α-blockers), which were introduced in the 1990s, have largely supplanted surgical therapy as first line treatment for BPH, as evidenced by the rapidly decreasing rate of BPH related surgery.[1] The number of prostatectomies performed in Medicare beneficiaries decreased from 250,000 in 1987 to 88,000 in 2000.[2] This 65% decrease in TURP occurred despite a sustained increase in the number of male beneficiaries and it coincided with a dramatic increase in office visits for BPH.[2] This change in the national treatment paradigm for BPH occurred with only limited analysis of the implications of its impact on BPH expenditures.

Although initial surgical treatment is more costly than initial medical therapy in the short term, to our knowledge the longer term costs associated with these treatment strategies are unknown, especially the costs associated with medical and surgical failures. Studies of this topic examined this question using computer models, relying on various assumptions drawn from experts and clinical trials.[3,4] To our knowledge data on complication rates and long-term expenditures associated with BPH treatment have not been reported. To gain insight into the costs of differing initial treatment strategies for BPH we evaluated the costs of initial medical or surgical therapy for BPH in a cohort of privately insured men followed for 5 years. Our primary hypothesis was that for younger men with BPH initial surgical treatment would be less expensive than lifelong medical therapy after accounting for treatment failure rates.

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MATERIALS AND METHODS

Data Source

We examined spending on BPH related services for nonelderly patients with employer provided insurance. The data included enrollment files as well as medical and pharmacy claims for 25 large employers in the United States covering 40,895 male beneficiaries 40 years and older who were continuously enrolled in their employer provided plan from 1997 to 2002. Claims files captured all health care claims and encounters, including prescription drugs. Medical claims included date of service, diagnosis and procedure codes, and expenditures, including billed charges, negotiated discounts, excluded expenses, deductibles, co-payments, payments made by the employer and employee, and other third party coverage. Drug claims included information on drug type, place of purchase and expenditures. The enrollment files allowed us to

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track who was eligible for services as well as basic demographics, such as patient age, gender, marital status and relationship to the sponsoring employee.

Cohort Identification

We identified patients receiving treatment for BPH based on diagnostic codes (International Classification of Disease, 9th edition), procedure codes (Common Procedural Terminology), and National Drug Codes for BPH and BPH related medications (see Appendix). Subjects were initially selected based on primary or secondary International Classification of Disease, 9th edition diagnosis codes for BPH. Men who had a claim as described in 1997 were excluded to create a cohort of incident cases of BPH in 1998. Subjects were further stratified according to the type of medical intervention (α-blocker alone, 5α-reductase inhibitor alone or combination therapy) using medication claims. These patients were then followed through their claims to determine the need for continued or additional therapy as well as related expenditures during the 5 years of observation.

To accomplish this, subjects were stratified into 2 cohorts according to their initial BPH treatment selection. Cohort 1 was composed of subjects who initially chose medical therapy with an α-blocker medication, a 5α-reductase inhibitor medication or a combination of the 2 medications. We also examined costs in the subgroup composed of subjects who initially were treated using medication but who later underwent a procedure to treat BPH (medication failure). Cohort 2 includes individuals who selected a BPH procedure for initial therapy. We also examined costs in the subgroup of subjects who subsequently received medical therapy for BPH after initial surgical therapy and the subgroup of those who subsequently underwent repeat surgery for BPH (surgical failure).

Annual medical and pharmacy expenditures were calculated for each cohort and subcohort. Expenditures consisted of total annual payments made by the enrollee (co-payments, deductibles and excluded expenses) and by all third party payers (primary and secondary coverage, and net of negotiated discounts) for BPH related medical services and prescription drug claims. Expenditures were tabulated for each group during the 5 years and a direct comparison was made. To determine total expenditures the expenditures for all BPH related office visits, inpatient stays, drugs and procedures were summed annually and after 5 years. Additionally, we calculated the net current value of initial medical vs surgical treatment for 5, 10, 20 and 40-year horizons. A discount rate of 3% was applied to these calculations and we assumed that prices were fixed in constant dollars.

RESULTS

Table 1 shows the age distribution of the sample. Of the subjects 1,952 had a new BPH diagnosis code in 1998 but no associated claim for medical or surgical therapy.

Of the 970 subjects identified who received BPH treatment 913 (94.1%) relied on medical therapy as initial treatment (cohort 1). Of those subjects 832 (91.1%) were on α-blockers, 62 (6.8%) were on 5α-reductase inhibitor therapy and 19 (2.1%) were on combination therapy with the 2 types of medication (table 2). Because of the small number of individuals on combination therapy, this group was analyzed with the cohort initially placed on 5 α-reductase inhibitors. Of total terazosin and doxazosin prescriptions 37% were for generic formulations of the drugs. A total of 71 men (7.8%) who were initially on medical therapy underwent a surgical procedure at a later date. Of these men 92% initially used α-blocker monotherapy, 7% initially used 5α-reductase inhibitors and 1% initially used combination therapy. Of the subjects 57 had surgical intervention as their index event, including transurethral prostatectomy in 56 and open prostatectomy in 1 (cohort 2). Seven of those men (12%) underwent a second procedure and 14 (25%) received subsequent medical therapy.

TABLE 1. *Sample subject age*

Group	No. Pts	Age		
		Range	Mean	Median
Entire cohort	970	40–91	70	70
BPH medication only	842	40–91	69	69
BPH medication + subsequent BPH procedure	71	45–83	70	71
BPH surgery only	39	48–90	73	73
BPH surgery + subsequent BPH medication	11	58–80	72	74
BPH surgery + subsequent repeat BPH surgery	7	66–82	72	70

For subjects choosing initial medical therapy who did not undergo subsequent surgery average time on medical therapy was 3.2 years. Of these subjects 10% filled only 1 prescription and excluding them increased average duration to 3.5 years. The mean time of medical therapy for subjects who started with medical therapy but subsequently underwent surgery was 2.5 years.

Table 3 lists expenditures for each cohort. In inflation adjusted 2002 dollars average total expenditures during the 5 study years were higher for subjects who initially underwent surgery ($12,699, 95% CI 9,865–15,533) than for those initially treated with medication ($2,193, 95% CI 1,959–2,428). At 5 years therapy with α-blocker medication was less expensive than therapy with 5α-reductase inhibitor (excluding subjects on combination therapy $1,397 vs $2,175, $p < 0.001$). Table 3 also lists expenditures by specific treatment paths. A total of 71 subjects initially chose medical therapy but underwent surgical therapy at some point in the next 5 years, which increased average total expenditures to $9,012 (95% CI 6,753–11,271). A total of 11 subjects underwent surgery initially but were subsequently placed on medical therapy, which resulted in 5-year average total expenditures of $11,745 (95% CI 6,857–16,634).

If future streams of spending were discounted at standard rates (3%), the costs of initial medical therapy would always be lower than initial surgical therapy. Even at 40 years the net current value of the initial medication strategy was $7,816, while the net current value of the initial surgical therapy strategy was $12,907 (table 4).

DISCUSSION

Our study has several significant findings. First, expenditures in a 5-year period were higher in the cohort of subjects initially choosing surgery and they continued to be higher in future time frames. Contrary to our hypothesis, there was no time frame at which surgical therapy was cumulatively less expensive than medical therapy in current value dollars. Total average expenditures during 5 years were significantly higher for subjects undergoing surgery as an initial

TABLE 2. *Initial and subsequent BPH treatments*

Index Event	No. Pts	No. Need: Medication After Procedure	No. Need: Procedure After Medication	No. Repeat Surgery	No. Repeat Surgery + Medication	No. No Secondary Intervention
All men	970					
Medical therapy	913		71			842
α-Blocker alone	832		65			767
5α-Reductase inhibitor	62		5			57
Combination treatment	19		1			18
Surgical intervention	57	14		7	3	39

treatment strategy. The dramatically higher expenditures associated with a surgical procedure during the initial study year were not significantly mitigated by lower medication costs. Our results are consistent with computer model based economic analyses of the direct treatment costs of α-blockers vs 5α-reductase inhibitors vs TURP.[3] Using a 2-year time frame Lowe et al found that costs for terazosin were about 38% of costs for TURP based on costs in a privately insured population, which is higher than our corresponding 11% rate.[3] This difference may be due to our longer time frame for analysis (capturing more treatment failures) or differences in the assumptions made in the model used by Lowe et al.

It is interesting to note that, although medical therapy for BPH with α-blockers may be considered lifelong therapy, the average duration of treatment in this study was shorter than the 5 years of available observation even when excluding subjects who only filled 1 prescription. This phenomenon contributed to lower expenditures in the cohort treated initially with medication. Expenditures for medical therapy in our study are smaller than those reported previously. Lowe et al performed a trial in men randomized to terazosin or placebo and reported health care costs from the perspective of the health care plan at 1 year.[3] Expenditures were calculated using a private insurance health care claims database. Annual expenditures were $2,932 in the terazosin group. However, in that study all health care use was recorded. Our data are specific to BPH related services. Medication costs in the terazosin group for year 1 were $327 more than in the placebo group, similar to annual costs in our α-blocker group. Given the results of the MTOPS trial, which showed that therapy with 5α-reductase inhibitor decreased the need for subsequent surgical therapy (or the medical therapy failure rate) by 55%,[5] medical therapy may be even more favored from a cost perspective if combination medical therapy is widely adopted.

Second, for those who were treated α-blocker medication was overwhelmingly the most common initial treatment in this sample of men with private insurance. This finding is consistent with trends documented nationally.[1] The numbers of subjects treated with 5α-reductase inhibitor or surgery was similar and far smaller than the number treated with α-blockers. Treatment with combination medical therapy was relatively rare. During the study period sparse data supported the effectiveness of 5α-reductase inhibitors as monotherapy or combination therapy in most men with BPH. However, subsequent publication of the MTOPS trial, which showed a significant decrease in the risk of BPH progression in men on combination therapy,[5] may have increased the initial use of combination therapy in men diagnosed with BPH in 2003 and later. Surprisingly only 33% of men with a new BPH diagnosis were treated in year 1 of diagnosis, a finding similar to the 23% active treatment rate in year 1 of diagnosis documented by Black et al in a proprietary claims database.[6] This finding may be partially the result of artifact since a physician claim for an office visit may include a diagnosis code for BPH if BPH is suspected as the reason for patient complaints. This diagnosis may later change, obviating the need for BPH treatment. Our bias is that this clinical scenario is not common enough to explain the high proportion of men on watchful waiting. We believe that these data support the thesis that many patient/physician dyads select watchful waiting as initial therapy. To our knowledge the true appropriate active treatment rate for men with BPH is undefined. In practice the active treatment rate may be influenced by several variables, including the structure of patient health care benefits.

Third, the secondary treatment rates for surgery far exceeded those for medical therapy. Approximately 8% of subjects on medical therapy required subsequent surgical intervention, while 25% undergoing surgery subsequently required medical therapy. Additionally, 12% of the surgery cohort required second surgery, including 5% who required second sur-

TABLE 3. *Five-year expenditures per individual by initial cohort and treatment*

	No. Pts	Mean Expenditure (95% CI) (2002 $)
Cohort:		
1 (medication)	913	2,193 (1,959–2,428)
2 (surgery)	57	12,699 (9,865–15,533)
Treatment:		
Medication only	842	1,618 (1,516–1,720)
Initial medication + then surgery	71	9,012 (6,753–11,271)
Surgery only	39	11,601 (7,923–15,279)
Initial surgery + then medication	11	11,745 (6,857–16,634)
Repeat surgery	7	20,313 (11,818–28,809)

TABLE 4. *Net current value of expenditures related to initial medical or surgical therapy projected over various time horizons*

Time Horizon (yrs)	Net Current Value (2002 $)
5:	
Medication first	1,882
Surgery first	10,719
10:	
Medication first	3,146
Surgery first	11,186
20:	
Medication first	5,179
Surgery first	11,935
40:	
Medication first	7,816
Surgery first	12,907

gery and received subsequent medical therapy, for a total secondary treatment rate of 37%. This secondary treatment rate is much larger than that reported in published clinical series (range 12%[7] to 16%[8]). Our higher rates of secondary treatment may reflect the relatively long followup in our cohort. Studies of TURP re-treatment rates describe outcomes at less than 2 years.[9] Additionally, subsequent treatment with BPH targeted medication is often inconsistently captured.[9]

A strength of our study design was that we were able to capture all resource use in our cohort during 5 years. Excluding TURP failures treated with medication only, our TURP failure rate is similar to that in prior reports. Our failure rate for initial medical treatment is similar to that reported in the literature. The MTOPS trial described an approximately 8% incidence of surgical therapy at 5 years for BPH in subjects initially treated with an α-adrenergic blocking medication,[5] as were most subjects in our study. This concordance may reflect similar followup in the 2 studies. Differences in failure rates in our study cohorts may reflect underlying clinical differences in this nonrandomized group since patients undergoing TURP as initial BPH treatment in the current decade likely present more frequently with severe disease. Adverse risk factors, such as detrusor fibrosis due to longstanding high pressure voiding, may be more prevalent in the surgical arm, clouding definitive conclusions regarding failure rates between our study cohorts. Nevertheless, the failure rates in this analysis provide a portrait of existing resource use for BPH treatment.

Limitations

Our study is a retrospective analysis and it has the limitations common to such studies. Our cohorts were subject to selection bias since subjects presenting with more severe symptoms, including those in acute urinary retention, were most likely over represented in the cohort treated initially with surgery. Subjects who were suboptimal surgical candidates were most likely over represented in the cohort initially treated with medication. This may have decreased expenditures in the medication arm by limiting the number of subjects who subsequently underwent surgical therapy. We were unable to identify any cases in which minimally invasive surgical modalities were used, such as transurethral microwave thermotherapy. These therapies avoid the surgical costs derived from use of the hospital operating room, and so they may alter the costs of surgical therapy if used widely. However, re-treatment rates for these technologies have yet to be clearly defined. We were unable to describe out of pocket costs for herbal medicines used by subjects for BPH treatment. Because our expenditure analysis is from the point of view of the health care system, we only present economic data. We do not consider the impact of treatment on quality of life or indirect costs of care. We also cannot account for a critical deciding factor in BPH treatment, which is patient preference.

CONCLUSIONS

In a cohort of privately insured men with newly diagnosed BPH monotherapy with α-blockers was the most common initial treatment. Surgical therapy was associated with higher treatment failure rates and higher costs during 5 years. Increased expenditures related to initial surgical therapy were consistent when projected over long time frames.

APPENDIX

Administrative Codes Used to Identify Subjects With BPH, or Use of BPH Related Medication or Procedures

1) <u>Any male 40 years or older with</u>
599.6 Obstructive uropathy
600.0 BPH
600.9 "Prostatism" not otherwise specified (median lobe) (prior to 2000, was 600)
Or
600.1 "Nodular prostate" excluding prostate cancer (prior to 2000, was 600)
600.2 Benign localized hyperplasia (eg adenoma of prostate, adenofibramatous hypertrophy of prostate) of prostate, excludes hypertrophy (prior to 2000, was 600)
If occurring with any of the procedure or BPH medication codes

2) Any male 40 years or older with
788.20 Urine retention or stasis not elsewhere classified
788.21 Incomplete bladder emptying
788.29 Other "specified" retention of urine
788.41 Urinary frequency
788.42 Polyuria
788.43 Nocturia
788.61 Intermittent or splitting urinary stream
788.62 Slowing or weak urinary stream
But not carrying diagnosis code 185 (prostate cancer) as another diagnosis

3) Any male undergoing 1 of the following BPH related procedure codes
International Classification of Disease-9 procedure codes
60.2 Transurethral prostatectomy
60.21 Transurethral ultrasound guided laser induced prostatectomy
60.29 Other transurethral prostatectomy (transurethral electrovaporization of prostate, excision of median bar)
60.3 Suprapubic open prostatectomy
60.4 Retropubic open prostectomy
60.94 Control (postoperative) hemorrhage of prostate
60.95 Balloon dilation of prostatic urethra
60.96 Transurethral microwave thermotherapy (added 2000, was 60.29)
60.97 Other transurethral destruction of prostatic tissue (eg transurethral needle ablation) (added 2000, was 60.29)
Common Procedural Terminology procedure codes
52450 Transurethral incision of prostate
52510 Transurethral balloon dilation of prostatic urethra
52601 Transurethral electrosurgical resection of prostate
52606 Transurethral fulguration of postoperative bleeding occurring after the usual followup
52612 Transurethral resection of prostate, first stage of 2-stage resection
52614 Second stage of 2-stage resection
52620 Transurethral resection of residual tissue after 90 postoperative days
52630 Of regrown tissue after 1 year post op
52640 Of resultant bladder neck contracture
52647 Noncontact laser coagulation of prostate
52648 Contact laser vaporization with or without transurethral resection
53850 Transurethral destruction of prostate tissue by microwave thermotherapy (added 1998)
53852 By radio frequency thermotherapy (added 1998)
55801 Prostatectomy, perineal, subtotal
55821 Prostatectomy, suprapubic, subtotal
55831 Prostatectomy, retropubic, subtotal

4) Or any male taking 1 of the following medications
Avodart®, Cardura®, doxazosin mesylate, Flomax®, finasteride, Hytrin®, Proscar®, terazosin, terazosin HCl, tamsulosin, dutasteride

Abbreviations and Acronyms

BPH = benign prostatic hyperplasia
MTOPS = Medical Therapy of Prostatic Symptoms
TURP = transurethral prostate resection

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EDITORIAL COMMENT

This is a retrospective analysis of administrative claims from a privately insured cohort of men with BPH. The authors conclude that initial surgical therapy for BPH was more costly and had a higher treatment failure rate than initial medical management for BPH in the short-term and projected long-term time frames. These findings are interesting and well presented. However, the data are derived from a select cohort of men with private insurance, calling into question the ability to extrapolate these findings to other cohorts of men, for example those with Medicare or Medicaid coverage. Furthermore, stratification of provider specialty was needed in these data to address potential treatment biases that may have existed among the different types of physician providers who submitted these claims. Specific knowledge of provider specialty, particularly as it pertained to medical management in this cohort, would allow the reader to more fully scrutinize the clinical and economic conclusions reached by the authors.

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