0022-5347/05/1734-1309/0
THE JOURNAL OF UROLOGY®

Vol. 173, 1309–1313, April 2005
Printed in U.S.A.
DOI: 10.1097/01.ju.0000152318.79184.6f

ECONOMIC COSTS OF BENIGN PROSTATIC HYPERPLASIA IN THE PRIVATE SECTOR

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ABSTRACT

Purpose: Several studies document the impact of benign prostatic hyperplasia (BPH) in working, aged men. Direct medical costs related to BPH treatment are largely borne by employees through higher premiums. However, indirect costs related to lost work are primarily borne by the employer. In this study we used claims data and absentee records from large employers to estimate the costs associated with BPH in working age males.

Materials and Methods: We used 2 data sources to examine direct and indirect costs associated with BPH in a privately insured, nonelderly population. Multivariate regression models were used to predict spending for persons with and without a medical claim for BPH, controlling for relevant covariates. Data on work loss were linked to medical claims to estimate work loss related to treatment for BPH.

Results: Mean annual expenditures were $4,193 for men without a medical claim for BPH. In contrast, annual spending was $5,729 for men with a claim for BPH. Thus, the incremental cost associated with a diagnosis of BPH was $1,536 yearly. Overall the average employee with the condition missed 7.3 hours of work yearly related to BPH with approximately 10% reporting some work loss related to a health care encounter for BPH.

Conclusions: Treatment of men with BPH places a significant burden on employees and their employers through direct medical costs as well as through lost work time. Direct and indirect costs to the private sector related to BPH treatment are estimated to be $3.9 billion.

KEY WORDS: prostate; costs and cost analysis; prostatic hyperplasia; insurance, major medical; economics, medical

Benign prostatic hyperplasia (BPH) places a significant burden on men with the condition and on the health care system. Population based data indicate that 75% of men 70 years or older have at least 1 lower urinary tract symptoms (LUTS) ascribed to BPH.[1] The histological prevalence of BPH is as high as 68% in men older than 50 years.[2] Estimates of national expenditures associated with BPH treatment have been as much as $4 billion.[3]

BPH and LUTS are often thought of as problems of the elderly population. However, the impact of this condition is also experienced in men of working age. Population based surveys, such as the National Health and Nutrition Examination Survey, have documented that the prevalence of specific LUTS (nocturia more than twice nightly, incomplete bladder emptying or urinary hesitancy) is 22% in 40 to 49-year-old men and 36% in 50 to 59-year-old men.[1] Other population based studies, such as the Olmsted County Study of Urinary Symptoms and Health Status, a cohort established to evaluate the natural history of BPH in white men, and the Flint Men's Health Study, a companion cohort of community dwelling black men, confirm that BPH and LUTS are prevalent in working age men. Symptoms of BPH are often measured using the American Urological Association Symptom Index (AUA SI), a validated, widely used instrument.[4] In men 40 to 49 years old moderate or severe AUA SI scores were present in 32% in the Flint Men's Health Study.[5] Moderate or severe AUA SI scores were present in 26% of 40 to 49-year-old men in the Olmsted County Study of Urinary Symptoms and Health Status.[5] For men who are 50 to 59 years old the prevalence of these symptom scores increased to 42% and 32.5% in the Flint and Olmstead County studies, respectively. BPH clearly places a burden on men of working age since between 2/10 and 4/10 men are affected depending on age.

Data suggest that a significant proportion of men of employment age with LUTS seek treatment for it. The application of Agency for Health Care Policy and Research (now Agency for Healthcare Research and Quality) BPH treatment guidelines[6] to data from the Olmsted County study indicates that almost 1 in 5 men who are 50 to 59 years old is eligible to discuss BPH treatment options.[7] In a cohort of men from Olmsted County in a 6-year period approximately 10% of those 50 to 59 years old actually sought treatment for LUTS related to BPH.[8] While medical or surgical therapy for BPH has likely decreased the frequency of costly end stage complications of the condition, including urosepsis and renal failure,[9] active treatment for BPH often entails long-term outpatient treatment or with decreasing frequency inpatient surgical care.[10] Thus, the relatively high prevalence of care seeking in adults of working age may be associated with substantial costs to employers and their employees. Direct medical costs related to BPH treatment are largely borne by employees through higher premiums. However, indirect costs related to lost work days or BPH related morbidity are primarily borne by the employer. In this study we used claims data and absentee records from large private employers to estimate the direct and indirect costs associated with BPH in working age males.

MATERIALS AND METHODS

Data sources. We used 2 data sources to examine the direct and indirect costs associated with BPH in a privately insured, nonelderly population. Data on medical and pharmaceutical use were obtained from a health benefits consulting firm (Ingenix, Salt Lake City, Utah). Data on work loss associated with the treatment of BPH were based on the

Submitted for publication July 6, 2004.
Supported by National Institute of Diabetes and Digestive and Kidney Diseases N01-DK-1–2460.
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Medstat Marketscan Database (Marketscan, Ann Arbor, Michigan).

Direct costs. We used a data set of claims from 25 large American employers covering 121,871 male beneficiaries 45 to 64 years old who were continuously enrolled for all of 1999. We excluded dependents and employees 65 years or older because we could not be sure that their use was not covered by other insurance. Claims files captured all health care claims and encounters, including prescription drugs. Medical claims included service date, diagnosis and procedure codes, and expenditures, including billed charges, negotiated discounts, excluded expenses, deductibles, copayments and payments made by the employer, employee and other third party coverage. Drug claims included information on drug type, place of purchase and expenditures.

Claims data contain records only on those who used services. To identify those who may not have used services enrollment data were also obtained. For each person enrollment files included age, sex, insurance plan type, residence zip code and relationship to employee.

Claims data were linked with information about plan benefits. Characteristics of the medical benefit included plan deductibles, copayments for services and plan type. Drug benefit design features that we coded included copayments for retail pharmacies and whether the plan required generic substitution.

Indirect costs. We used Marketscan data to estimate lost work hours associated with BPH treatment. Marketscan data link enrollment files, health care claims and absence data on a subset of private employers. Absence data are derived from employee time reporting records collected through employer payroll systems and they contain detailed information on when employees were out of work, the number of work hours missed and the reasons for absences (sickness, short-term disability, vacation and other types of leave). Reported work absences were linked to the enrollment file and medical claims to estimate work loss related to medical treatment for BPH.

To be included in the analysis persons had to be enrolled in the health plan throughout the year and have a medical claim with a primary diagnosis of BPH (2,013 individuals). Persons in the top 0.5% of total absences during the year and those on long-term disability or covered by COBRA (Consolidated Omnibus Budget Reconciliation Act) were excluded.

Estimating medical spending. Multivariate regression models were used to predict medical and pharmacy spending in 1999 for persons with and without a medical claim for BPH, controlling for differences in patient demographics, health status and insurance coverage. The primary outcomes of interest were annual medical and pharmacy expenditures per person. Expenditures consisted of total annual payments made by the enrollee (copayments, deductibles and excluded expenses) and by all third party payers (primary and secondary coverage, and net of negotiated discounts) for medical services and prescription drug claims.

Covariates were a set of variables to describe medical and drug benefits, including individual plan deductibles, copayments rates and a binary indicator for insurance plan type. Other covariates were age, sex, work status (active or retired), urban residence and median household income in the zip code of residence. Observed differences in comorbid conditions were controlled for based on International Classification of Diseases-9 (ICD-9) diagnostic codes from medical claims files. Medical claims were used to identify individuals treated for any of 26 chronic conditions and they included a binary indicator for each condition.

Statistical analyses used a 2 part model to estimate drug spending and a 1 part model for medical expenditures. The first part of the model used probit regression to estimate the probability that a member of the study sample had at least 1 medical or pharmacy claim. The second part of the model used a generalized linear model with a logarithmic link function to estimate the level of spending among members with at least 1 claim for the outcome of interest. The 2 model parts were combined to predict average annual spending for persons with and without a urological condition, controlling for other factors known to affect use. Specifically estimates from the first part of the model were used to predict the probability of nonzero expenditures for persons with and without a specific urological condition. Similarly the second part of the model was used to predict expenditures, conditional on having at least 1 claim, for each of the 2 groups. Total drug expenditures were calculated as the product of the 2 parts of the model and they were averaged over all individuals in the sample. We used the bootstrap, a general method for estimating the sampling distribution of a statistic, to derive SE of the predictions and calculated 95% CIs.[11] All statistical analyses were done using Stata software, version 4.0 (StataCorp, College Station, Texas).

Estimating work loss. Assigning work absences to specific medical treatments required a complex algorithm. In general the dates of an inpatient stay or ambulatory visit with a primary diagnosis of BPH were matched to individual absence data. Absences associated with a hospitalization included work loss reported between hospital admission and discharge dates, including days contiguous to those dates. For example, suppose a person were admitted to the hospital on June 1 with a primary diagnosis of LUTS and discharged home on June 5. Any sick time or short-term disability in that period as well as on contiguous days before June 1 and after June 5 would be counted. However, work loss reported on June 7 would not be included if the employee did not miss any work time on June 6. Short-term disability hours for individuals for whom the start date coincided with a hospital admission and for whom there was a return to work date were included. Work absences were capped at 12 hours if the beginning and end dates of the absence were the same.

Work absences associated with ambulatory visits were calculated in 2 ways. The first method included absences contiguous to the date of the visit. The second, more conservative approach excluded absences on contiguous days unless there was some work loss on the day of the visit. For example, the first approach would count an appropriate work absence on Wednesday associated with a medical visit for BPH on Tuesday. The second approach would not count the work loss on Wednesday unless there were also an absence on Tuesday. If 2 outpatient visits occurred in the span of 1 absence, hours absent before the first visit counted toward the first visit and hours absent after the second visit counted toward the second visit.

Case definition. The Appendix lists administrative codes used to define BPH. In addition to ICD-9 CM diagnosis codes that specifically contain the descriptor BPH, we included codes that describe specific LUTS, such as nocturia and urinary frequency, if the individual did not also carry a diagnosis of prostate cancer.

RESULTS

Although BPH is more prevalent in older adults, it commonly affects working age males. We observed prevalence rates of 4.7% in 45 to 54-year-old men in our sample and 14.3% in those 55 to 64 years old based on an inpatient or outpatient medical claim with a primary diagnosis of BPH (table 1).

Direct costs. Adjusted mean annual expenditures were $4,193 for privately insured men 45 to 64 years old without a medical claim for BPH in 1999. In contrast, annual spending was $5,729 for similar adults with an inpatient or outpatient claim for BPH (table 2). Thus, the incremental cost associated with a diagnosis of BPH was $1,536 yearly with pharmaceutical expenses comprising about 19% of overall spend-

TABLE 1. *BPH prevalence by age group**

Age	Prevalence Rate
45–54	4.7
55–64	14.3

Based on a 1999 medical claim with a primary diagnosis of BPH, as defined in Appendix.
* Ingenix, 1999.

ing. Differences in spending varied only modestly by age and country region after adjusting for demographic, socioeconomic and clinical risk factors. While medical spending increased slightly with age in men those without a medical claim for BPH, costs were higher in 45 to 54-year-old men with BPH compared with similar 55 to 64-year-old adults.

Indirect costs. A medical claim for BPH was also associated with modest work loss. Overall the average employee with the condition missed 7.3 hours of work yearly (95% CI 4.8 to 9.8) related to BPH with just more than 10% reporting some work loss or disability temporally related to a health care encounter for BPH in 1999 (tables 3 and 4). While only a minority of employees receiving treatment for BPH missed some work time, average work loss exceeded 9 days yearly in those reporting some absence temporally related to BPH treatment. Ambulatory visits were responsible for the majority of lost work time with an average work loss of 4.7 hours per visit (95% CI 3.3 to 6.1) (table 5).

DISCUSSION

We found that in a population of more than 120,000 working age males with employer sponsored health insurance BPH treatment resulted in $17.6 million in health care expenditures. Furthermore, the average 45 to 64-year-old employee receiving care for BPH missed about 1 day of work yearly due to treatment for the condition. The only comparable estimates are from Hillman et al, who found marginally lower medical costs and substantially higher indirect costs in a sample of 46 to 94-year-old men with moderate to severe BPH symptoms.[12] Their analysis excluded surgical treatment for BPH and relied on self-reported measures of total work loss, which may or may not have been related to BPH. Our claims based analyses examined medical costs and work loss associated specifically with BPH treatment.

Although BPH is more common in older adults, we found that at least 9.4% of 45 to 64-year-old males with employer provided insurance were receiving treatment for the condition in 1999 with incremental costs of $1,536 yearly. Applying our prevalence estimates to national employment data suggested that there are more than 2.2 million 45 to 64-year-old men in the labor force who may be receiving treatment for LUTS related to BPH in a given year. Treating these individuals would result in $3.4 billion in health care expenditures and 2 million lost workdays. If each day of lost work were to cost an employer $250, the indirect cost borne by employers would be approximately $500 million.

Our study has several limitations. Data are from a non-

TABLE 3. *Estimated annual expenditures for privately insured males 45 to 64 years old without medical claim for BPH in 1999**

	$ Annual Expenditures/Person-Yr (95% CI)	
	Medical	Prescription Drugs
No. pts	110,426	
All	3,257 (3,196–3,318)	936 (925–947)
Age:		
45–54	3,157 (3,095–3,219)	931 (917–945)
55–64	3,303 (3,243–3,363)	938 (928–948)
Region:		
Northeast	2,922 (2,851–2,993)	848 (837–859)
Midwest	3,455 (3,395–3,515)	969 (956–982)
South	3,399 (3,333–3,465)	1,006 (992–1,020)
West	3,454 (3,393–3,515)	955 (942–968)

Annual expenditures per person in primary beneficiaries 45 to 64 years old with employer provided insurance who were continuously enrolled in a health plan in 1999 with estimated annual expenditures derived from multivariate models controlling for age, sex, work status (active/retired), median household income (zip code), urban/rural residence, medical and drug plan characteristics (plan type, deductible and co-insurance/copayments) and comorbid conditions.
* Ingenix, 1999.

TABLE 4. *Annual work loss for persons treated for BPH/LUTS**

No. pts	2,013
% Missing work	10
Av hrs work absence (95% CI):	
Inpt	0.2 (0.1–0.3)
Outpt	7.1 (4.6–9.6)
Total	7.3 (4.8–9.8)

Unit of observation is individual with inpatient or outpatient claim for BPH/LUTS and for whom absence data were collected with work loss based on reported absences contiguous to admission and discharge dates of each hospitalization and outpatient visit.
* Marketscan, 1999.

TABLE 5. *Work loss associated with ambulatory care visit for BPH/LUTS**

No. outpt visits	3.036
Av hrs work absence (95% CI)	4.47 (3.3–6.1)

Unit of observation is treatment episode with work loss based on reported absences contiguous to admission and discharge dates of each hospitalization and outpatient visit.
* Marketscan, 1999.

TABLE 2. *Estimated annual expenditures for privately insured males 45 to 64 years old with and without medical claim for BPH in 1999**

	$ Annual Expenditures/Person-Yr (95% CI)			
	Total No. BPH	Total BPH	Medical BPH	Prescription Drugs BPH
No. pts	110,426		11,445	
All	4,193 (4,124–4,262)	5,729 (5,627–5,831)	4,658 (4,562–4,754)	1,071 (1,060–1,082)
Age:				
45–54	4,088 (4,015–4,161)	6,042 (5,923–6,161)	4,917 (4,810–5,024)	1,125 (1,107–1,143)
55–64	4,241 (4,175–4,307)	5,796 (5,697–5,895)	4,724 (4,629–4,819)	1,072 (1,063–1,081)
Region:				
Northeast	3,770 (3,694–3,846)	5,155 (5,049–5,261)	4,178 (4,074–4,282)	977 (967–987)
Midwest	4,424 (4,355–4,493)	6,050 (5,941–6,159)	4,940 (4,838–5,042)	1,110 (1,097–1,123)
South	4,405 (4,329–4,481)	6,004 (5,893–6,115)	4,861 (4,758–4,964)	1,143 (1,130–1,156)
West	4,409 (4,341–4,477)	6,040 (5,938–6,142)	4,938 (4,839–5,037)	1,102 (1,089–1,115)

Annual expenditures per person in primary beneficiaries 45 to 64 years old with employer provided insurance who were continuously enrolled in a health plan in 1999 with estimated annual expenditures derived from multivariate models controlling for age, sex, work status (active/retired), median household income (zip code), urban/rural residence, medical and drug plan characteristics (plan type, deductible and co-insurance/copayments) and comorbid conditions.
* Ingenix, 1999.

random sample of large employers whose employees may differ from the working age population in the United States. While we used multivariate models to minimize differences in medical care use between individuals with and without a diagnosis of BPH, there may be unmeasured factors that affect the use of medical services that were omitted from our analysis. We relied on claims data to identify individuals receiving BPH treatment. Administrative data are neither as specific nor sensitive as clinical examination data for classifying patients who truly have BPH as opposed to conditions that can mimic BPH, such as prostatitis. However, administrative data capture the billing diagnosis decided on using the best judgment of the treating physician. An additional limitation of medical claims is that they do not capture the severity of illness or allow us directly to link work absences to specific treatments. We did not capture the impact of BPH on patient quality of life. Prior work suggests that this cost is considerable.[13] Finally, we identified individuals with BPH based on primary diagnoses only. This understates the burden of the condition, although it is likely to capture the most severe cases.

CONCLUSIONS

The treatment of men with BPH places a significant burden on employees and their employers through the direct medical costs of treating the condition as well as through lost work time. Taken together direct and indirect costs to the private sector related to BPH treatment are estimated to be $3.9 billion.

APPENDIX: ICD-9

And Common Procedural Terminology-4 administrative code based algorithm used to define BPH cases

ICD-9 diagnosis code:
599.6 Obstructive uropathy
600.0 BPH
or
ICD-9 procedure code:
60.2 Transurethral prostatectomy
60.21 Transurethral ultrasound guided laser induced prostatectomy (TULIP)
60.29 Other transurethral prostatectomy (TEVAP, excision of median bar)
60.3 Suprapubic open prostatectomy
60.4 Retropubic open prostatectomy
60.94 Control (postoperative) hemorrhage of prostate
60.95 Balloon dilation of prostatic urethra
or
Common Procedural Terminology-4 procedure code:
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 time
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 Transurethral resection of residual tissue of regrown tissue after 1 year postoperatively
52640 Transurethral resection of residual tissue 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
53852 Transurethral destruction of prostate tissue by radio frequency thermotherapy
55801 Prostatectomy, perineal, subtotal
55821 Prostatectomy, suprapubic, subtotal
55831 Prostatectomy, retropubic, subtotal
or
any male with the following ICD-9 diagnosis codes who does not have diagnosis code 185 (prostate cancer) as another diagnosis:
788.20 Urine retention or stasis NEC
788.21 Incomplete bladder emptying
788.29 Other “specified” retention of urine
788.41 Urine frequency
788.42 Polyuria
788.43 Nocturia
788.61 Intermittent or splitting urinary stream
788.62 Slowing or weak urinary stream

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