

# The Economic Impact of Chronic Prostatitis

*The Chronic Prostatitis Collaborative Research Network\**

**Background:** Little information exists on the economic impact of chronic prostatitis. The objective of this study was to determine the direct and indirect costs associated with chronic prostatitis.

**Methods:** Outcomes were assessed using a questionnaire designed to capture health care resource utilization. Resource estimates were converted into unit costs with direct medical cost estimates based on hospital cost-accounting data and indirect costs based on modified labor force, employment, and earnings data from the US Census Bureau.

**Results:** The total direct costs for the 3 months prior to entry into the cohort, excluding hospitalization, were \$126915 for the 167 study participants for an average of \$954 per person among the 133 consumers. Of the men, 26% reported work loss valued at an average of \$551. The average total costs (direct and indirect) for the 3 months was \$1099 per person for those 137 men who had re-

source consumption with an expected annual total cost per person of \$4397. For those study participants with any incurred costs, tests for association revealed that the National Institutes of Health Chronic Prostatitis Symptom Index ( $P < .001$ ) and each of the 3 subcategories of pain ( $P = .003$ ), urinary function ( $P = .03$ ), and quality-of-life ( $P = .002$ ) were significantly associated with resource use, although the quality-of-life subscale score from the National Institutes of Health Chronic Prostatitis Symptom Index was the only predictor of resource consumption.

**Conclusions:** Chronic prostatitis is associated with substantial costs and lower quality-of-life scores, which predicted resource consumption. The economic impact of chronic prostatitis warrants increased medical attention and resources to identify and test effective treatment strategies.

*Arch Intern Med.* 2004;164:1231-1236

**C**HRONIC PROSTATITIS/chronic pelvic pain syndrome (CPPS) is a common syndrome of uncertain etiology. From 1990 to 1994, CPPS accounted for almost 2 million outpatient visits per year in the United States, 8% of visits to urologists, and 1% of visits to primary care physicians.<sup>1</sup> Chronic prostatitis remains enigmatic<sup>2,3</sup>; its hallmark is a symptom complex of pelvic pain<sup>4</sup> and lower urinary tract symptoms.<sup>5,6</sup> Among the available diagnostic tests for CPPS, reliability is low and none is a gold standard. The efficacy of the most common treatments—antibiotics and  $\alpha$ -blockers—is not strongly supported by existing evidence.<sup>7</sup> The condition has a negative impact on the physical and psychological functioning of affected individuals. Patients report physical difficulties and symptoms associated with depression, hypochondriasis, hysteria, and somaticization.<sup>8</sup> Although chronic pros-

tatitis causes substantial distress and accounts for a significant proportion of outpatient physician visits, its direct and indirect costs have not been well quantified.

There are several reasons to examine the financial burden of chronic prostatitis. Burden of illness studies can help define the distribution of resources used in treatment and help target groups most in need of health care interventions. Relative cost data can then be used to help establish treatment priorities at a time when health care resources are increasingly scarce. Burden of illness is measured in many different ways. The individual burden is often measured in terms of physical condition or effect on quality of life. The societal burden of disease is measured in economic terms as the direct and indirect costs of illness. Direct costs include primarily the costs of medical care, while indirect costs of illness include work absenteeism, decreased productivity while

\*The authors, along with the other members of the Chronic Prostatitis Collaborative Research Network, are listed in the box on page 1235. Author affiliations are listed at the end of this article. The authors have no relevant financial interest in this article.

at work, and economic disruption in other roles (eg, needing helpers to complete regular tasks, such as child care or yard work).<sup>9</sup> The goal of our study was to examine in a subset of men enrolled in a nationwide multicenter prospective cohort study conducted by the Chronic Prostatitis Collaborative Research Network (CPCRN) the direct and indirect costs associated with chronic prostatitis and determine the factors that predict these costs.

## METHODS

### SUBJECTS

The subjects included 167 consecutive men who enrolled in the Chronic Prostatitis Cohort (CPC), which was initiated by the National Institutes of Health (CPCRN). The CPCRN comprises 12 Clinical Research Centers located in Baltimore, Md; Boston, Mass; Chicago, Ill; Jackson, Miss; Tucson, Ariz; Los Angeles, Calif; Philadelphia, Pa; Fort Lauderdale, Fla; and Kingston and Toronto, Ontario; and a Data Coordinating Center in Philadelphia. The primary entrance criterion was pain in the pelvic region for at least a 3-month period within the last 6 months. Subjects were excluded from participation in the study if they had genitourinary cancer or an active genitourinary infection and if they had prior prostate procedures or surgical procedures. An extensive list of inclusion and exclusion criteria has been previously published.<sup>10</sup>

### STUDY DESIGN

The protocol for the study was approved by the institutional review board of each participating clinical center. Each study participant underwent a history and physical examination and laboratory studies and completed the National Institutes of Health Chronic Prostatitis Symptom Index (NIH-CPSI)<sup>11</sup> and a detailed questionnaire on demographics and lifestyle factors. The NIH-CPSI is an index of 9 items that address 4 different aspects of the chronic prostatitis experience. The primary component is pain, which is captured by 4 items that focus on location, severity, and frequency. Urinary function, another important component of patients' symptoms, is captured in 2 items of lower urinary tract symptoms. Impact on and overall quality of life are captured with 3 additional items that ask about the effect of symptoms on daily activities.<sup>11</sup>

Among the 488 CPC participants, 167 consecutively enrolled patients were given an additional health resource utilization questionnaire to participate in this study. Study participants were given the health resource utilization questionnaire at their initial visit, with instructions to complete it and bring it with them at their next visit 7 days later. This questionnaire was designed to assess utilization of health care resources attributable directly to prostatitis. The men were queried about resources used as a result of their prostatitis during the last 3 months. A number of studies verify the accuracy of using patient self-report to document resource utilization and work loss.<sup>8,12-14</sup> The resources queried included outpatient visits from traditional and alternative health care providers, laboratory tests, phone calls to health care providers, home health visits, medications (including over the counter), medical devices, lost work time and productivity, caregiver time, and lost leisure time. Lifetime hospitalizations for prostatitis were also assessed with unit costs derived from hospital bills for inpatient stays, the Medicare Physician Fee Schedule for outpatient services, and the 1999 *Red Book* for pharmaceuticals.<sup>15</sup> Device costs were calculated from the average price at 3 national drugstore chains. Telephone calls to medical providers (estimated to be 15 minutes) were quantified based on patients' report of whether they spoke

to a physician (\$25) or a nurse (\$10).<sup>16</sup> Standard unit costs were multiplied by the number of visits, laboratory tests, hospitalizations, medications, phone calls, and medical devices to calculate an estimate of the direct costs per person. Modified labor force, employment, and earnings data from the US Census Bureau<sup>17</sup> were used to estimate the indirect costs (ie, work loss) per person. The direct and indirect costs incurred by each patient were derived by multiplying each patient-reported unit of resource utilization to its corresponding cost. All costs were in US dollars. Costs incurred by study participants in the single center located in Canada were converted into US dollars.

Univariate analyses were conducted to assess the association between incurred costs and various demographic, symptom, and medical history factors. Tests for association were computed using generalized Mantel-Haenszel procedures (based on rank scores) to adjust for the variation among clinical centers. Factors that were significantly associated with incurred costs ( $P < .15$ ) were then entered into a multivariable mixed effects model. All multivariable results were adjusted for income and clustering within clinical centers. This procedure was performed separately for all 167 subjects and for the 137 subjects who incurred any costs.

A common problem to almost all economic analyses is the skewness of resource utilization and cost data. Therefore, rank scores were used for the univariate analyses and costs were transformed using a natural log transformation for the mixed effects models. For the analysis of all subjects, the transformation was  $\ln(\text{total costs} + 1)$ . All statistical analyses were done using SAS version 8.1.<sup>18</sup>

## RESULTS

### DEMOGRAPHICS

The average age of the participants was 44 years, and 78% were white. Half of the men (51%) had completed some college and 31% had attained a graduate or professional degree. Most (67%) were living with a partner or spouse; 80% were employed, with 52% earning more than \$50 000 annually. Major demographic characteristics were not significantly different among resource utilization study participants compared with the remaining members of the cohort (**Table 1**).

### RESOURCE USE

Of the participants, 82% accrued some costs over the 3 months prior to enrollment in the cohort study; 80% of the men had direct costs in the 3 months prior to enrollment in the CPCRN cohort study, and 26% had indirect costs during this same period. The average total costs (direct and indirect) for the 3 months were \$1099 per person, with a range of \$10 to \$10832. Procedures/tests (mean = \$761) were the largest component of direct costs followed by health care visits (mean = \$325) and medication (mean = \$282). Of the men, 49% reported having a procedure during the previous 3 months, with an average of 6 procedures during this period. The most common procedures/tests were urinalysis, urine culture, and prostate massage. There were 64% who saw a physician during the last 3 months, with an average of 5 visits per individual; 52% visited a urologist; 20% visited a primary care physician; 7% were seen in an urgent care or emergency department setting; and 6% sought an acu-

puncturist for care (**Table 2**). Incurring medication costs over the last 3 months were reported by 48% of the men, with an average of 2.5 prescriptions for prostatitis prior to enrollment in the cohort study. Infrequently reported costs were for medical devices, which was reported by only 8% of the men. Lifetime hospitalizations were reported by 8% of the men in the study. The average cost of the hospitalizations was \$11 639, with a range of \$2202 to \$57 252. The distribution of costs differed within the participating clinical centers; Queen's University, Kingston, Ontario, and the University of Mississippi, Jackson, had the highest percentage of individuals not incurring any costs over the previous 3 months (31% and 53%, respectively). In addition, there was a large distribution of costs across the study participants: 42 of the men incurred over \$1000 in total costs, while 41 men incurred less than \$80 in total costs.

Of the men, 26% reported that their prostatitis resulted in absenteeism from work at an average cost of \$551 over the last 3 months (Table 2). An additional cost, not quantified in this study, but costly to society, is reduced productivity: 79% of the men reported being at least a little less productive while at work and attributed 50% of this productivity loss to their prostatitis symptoms. Additionally, 22% of the men reported having a friend or spouse help them with personal care, medical care, or activities around the house because of their prostatitis. Only 4% of the men had to have a paid worker help them because of their prostatitis. Overall, 49% of the men reported that prostatitis disrupted their leisure time, averaging a 20% reduction in the amount of time spent for leisure activities.

For those study participants with any incurred costs, tests for association revealed that the NIH-CPSI ( $P < .001$ ), together with each of the 3 subcategories (pain [ $P = .003$ ], urinary function [ $P = .03$ ], and quality of life [ $P = .002$ ]) were significantly associated with resource use. When all participants are included, including those with zero cost for the study period, all but urinary function remain significant (pain [ $P = .001$ ], quality of life [ $P < .001$ ], and overall CPSI score [ $P = .001$ ]).

In an effort to further characterize the predictors of high cost within a multivariate model, mixed effects models were fit. The first model included all participants in the study, those with and without resource consumption over the study period. The results of this model, given in **Table 3**, describe the predictors for men diagnosed as having chronic prostatitis. This model demonstrates that for each unit decrease in quality of life as measured by the NIH-CPSI, there is a corresponding 25% (95% confidence interval, 4.5%-56.0%) increase in dollars consumed.

The second model, incorporating data only from those who have resource consumption over the prior 3 months, given in **Table 4**, indicates that for each unit decrease in quality of life there is a corresponding increase of 14% (95% confidence interval, 3.1%-94.0%) in the amount of dollars consumed.

The 2 models present 2 different interpretations. The subgroup of men who consumed resources help to provide an interpretation about the impact of various patient or health factors on an individual level, while the

**Table 1. Comparison of Resource Utilization Study (RUS) Participants With the Remainder of Chronic Prostatitis Cohort Participants\***

Variable	RUS Participants (n = 167)	Remainder of Cohort (n = 321)	P Value†
Age, y			
<25	8 (4.8)	13 (4.1)	.09
25-34	25 (15.0)	72 (22.4)	
35-44	61 (36.5)	120 (37.4)	
45-54	49 (29.3)	74 (23.1)	
≥55	24 (14.4)	42 (13.1)	
Race: white	131 (78.4)	273 (85.3)	.29
Education			
At least some high school	30 (18.0)	42 (13.1)	.39
At least some college	85 (50.9)	176 (55.0)	
Graduate/professional	52 (31.1)	102 (31.9)	
Income >\$50 000/y	86 (52.1)	170 (53.8)	.58
Living with spouse/partner	112 (67.1)	212 (66.3)	.85
Employment status			
Employed	134 (80.2)	265 (82.8)	.43
Unemployed	16 (9.6)	17 (5.3)	
Retired	14 (8.4)	22 (6.9)	
Disabled	3 (1.8)	16 (5.0)	

\*Data are number (percentage) of participants unless otherwise specified. †P values are adjusted for clustering among clinical centers using generalized Mantel-Haenszel methods.

model with all study participants provides information generalizable at the population level.

One would suspect that the impact of quality of life on resource utilization would be greater in the subgroup of men who consumed resources. Although the coefficient is higher (0.25) when, including the men with zero resource consumption (Table 3), the lower model coefficient (0.14) among those who consumed resources (Table 4) can be attributed to the fact that the model intercept is much higher, and thus the slope for the quality-of-life coefficient is much lower, since there are no participants with zero resource consumption.

#### COMMENT

To our knowledge this is the first study assessing the direct and indirect costs associated with CPPS. We believe these estimates represent a reasonable approximation of the costs associated with CPPS, since the costs estimates used were based on national data.

We demonstrated that the management of prostatitis is associated with substantial direct and indirect costs. We believe that our estimate of cost is conservative, since we did not quantify the loss of work productivity reported by 79% of the study participants and did not include hospitalization costs. The average total cost per person is \$1099 over the 3-month study period, with a projected annual total cost (direct+indirect) per person of \$4397, including \$3817 in direct medical costs. This cost is substantial when the average per capita health expenditure in 2000 for the United States was \$4636.<sup>19</sup> Most studies that have assessed the burden of illness have used administrative data or only

**Table 2. Costs for Prostatitis-Related Resource Utilization Within the Past 3 Months (n = 167)\***

Resource Category	No. (%) of Consumers	Costs per Person Among Consumers, \$			
		Median	Mean (SD)	Range	Sum
Hospitalization (lifetime)	14 (8.4)	3303.00	11 639.14 (18 633.19)	2202.00-57 252.00	162 948.00
Indirect costs: patient work loss	43 (25.7)	333.00	551.12 (627.41)	14.72-3676.80	23 698.36
Direct costs	133 (79.6)	477.60	954.25 (1503.81)	10.00-10 831.64	126 915.05
Emergency department	12 (7.2)	500.00	416.67 (162.83)	250.00-750.00	5000.00
Health care visits	107 (64.1)	190.00	324.66 (520.89)	40.00-3736.00	34 739.00
Phone calls/e-mails	52 (31.1)	25.00	48.85 (78.19)	10.00-500.00	2540.00
Medication	80 (47.9)	140.69	282.28 (436.63)	2.50-2352.60	22 582.05
Devices	13 (7.8)	30.00	33.46 (17.60)	10.00-80.00	435.00
Procedures	81 (48.5)	278.00	760.73 (1290.00)	21.00-7764.00	61 619.00
Total costs (indirect+direct)	137 (82.0)	555.61	1099.37 (1611.81)	10.00-10 831.64	150 613.41

\*Except for hospitalizations that span the consumer's lifetime.

**Table 3. Estimated Coefficients for Predicting ln (Total Costs +1) (n = 167)\***

Variable	Coefficient	P Value†
Age (1-y increase)	-0.015	.45
Race (white vs black)	0.47	.41
Pain‡	0.0081	.90
Urinary‡	-0.048	.51
Quality of life‡	0.25	.02
Gastrointestinal disease (yes vs no)	0.79	.19
Genitourinary disease (yes vs no)	-0.11	.81

\*Multiple regression analysis results.

†Models are adjusted for income and clustering by center using a mixed-effects model.

‡Subscale within Chronic Prostatitis Symptom Index (1-unit increase in score).

**Table 4. Estimated Coefficients for Predicting ln (Total Costs) for Subjects Reporting Incurred Costs (n = 137)\***

Variable	Coefficient	P Value†
Age (1-y increase)	-0.018	.12
Race (white vs black)	0.45	.19
Pain‡	-0.022	.54
Urinary‡	0.0097	.81
Quality of life‡	0.14	.01
Genitourinary disease (yes vs no)	0.28	.28

\*Multiple regression analysis results.

†Models are adjusted for income and clustering by center using a mixed-effects model.

‡Subscale within Chronic Prostatitis Symptom Index (1-unit increase in score).

report aggregate costs figures across the population that allow for limited comparisons. However, studies assessing the burden of disease using patient report have revealed the total annual direct medical costs for rheumatoid arthritis to be \$2533,<sup>20</sup> peripheral neuropathy to be \$917,<sup>16</sup> and low back pain to be \$2144.<sup>21</sup> Mathias and colleagues<sup>22</sup> studied the economic impact of chronic pelvic pain in women and found that 15% of the 773 respondents with chronic pelvic pain in the last 3 months reported lost time from paid work, and 45% reported reduced work productivity. The annual aggregate direct costs for physician services and out-of-pocket costs was reported to be \$2.8 billion for the US population.<sup>22</sup>

The CPSI quality-of-life scores were significant predictors of resource consumption. Men in this study who reported that their symptoms kept them from doing the things they would usually do, who thought more often about their symptoms, and were unwilling to spend the rest of their life with the symptoms were the highest consumers of resources.

There are several limitations to this study. Our data collection methods relied on self-report of the men's resource utilization, which is subject to participant recall problems. However, a number of other studies have used validation methods and verify the accuracy of patient self-report.<sup>12-14</sup> Second, participants were

recruited to tertiary care centers, many of which are regionally or nationally known for the treatment of chronic prostatitis, and were volunteers for the study. We recognize that these factors may increase the severity of the condition for men participating in our study compared with an average man with chronic prostatitis outside this study. However, even if the costs estimates were 30% lower, the economic burden is still substantial at \$3078 annually. Finally, our relatively small sample size and limited minority population may limit our ability to generalize the findings.

The burden of illness from chronic prostatitis is substantial, with prevalence estimates ranging from 9% to 16% in the general population.<sup>1,23,24</sup> With an expected annual total cost per patient of \$4397, the economic impact is substantial. In addition, the non-monetary, human costs associated with chronic prostatitis from pain and suffering, reduced productivity while at work, and lost leisure time has not been quantified in this study.

This study demonstrates the high percentage of men utilizing a large number services and resources for chronic prostatitis. Of the study participants, 82% had some resource utilization, with a mean number of 6 procedures, 5 physician visits, and 2.5 prescriptions for chronic prostatitis over the course of 3 months prior to enrollment in the cohort study.

Authors: Elizabeth A. Calhoun, PhD; Mary McNaughton Collins, MD, MPH; Michel A. Pontari, MD; Michael P. O'Leary, MD, MPH; Benjamin E. Leiby, BA; J. Richard Landis, PhD; John W. Kusek, PhD; and Mark S. Litwin, MD, MPH.

Other members of the Chronic Prostatitis Collaborative Research Network are listed below.

Northwestern University, Chicago, Ill: Anthony J. Schaeffer, MD (principal investigator); Charles L. Bennett, MD, PhD; Wade Bushman, MD, PhD; Elizabeth A. Calhoun, PhD; Alisa Erika Koch, MD; Robert B. Nadler, MD; Darlene Marko, RN; Marylin Dopona; Brigham and Women's Hospital, Boston, Mass: Michael P. O'Leary, MD, MPH (principal investigator); Cindy Williams; Debra Rhodes, MD; Massachusetts General Hospital, Boston: Mary McNaughton Collins, MD, MPH; Michael J. Barry, MD; Queen's University, Kingston, Ontario: J. Curtis Nickel, MD (principal investigator); Dale Ardern, RN; Janet Clark, ACT; Joseph Downey, MSc; University of Toronto, Toronto, Ontario: Keith Jarvi, MD; Lori L. Burrows, PhD; Temple University, Philadelphia, Pa: Michel A. Pontari, MD (principal investigator); Michael R. Ruggieri, PhD; Linda Kish, BA; Sharon Filer-Maerten, BS; Cecilia Dobi, BA; University of California, Los Angeles: Mark S. Litwin, MD, MPH (principal investigator); Scott I. Zeitlin, MD; Yining Xie, MD; Sylvia Sanchez; University of Maryland, College Park: Richard B. Alexander, MD (principal investigator); Cindy S. Lowder, MS, RN; University of Mississippi, Jackson: Jackson E. Fowler, Jr, MD (principal investigator); Rachael Tapley, RHIA; Dell Lumpkin, LPN; Anne Dautenhahn; Cleveland Clinic, Fort Lauderdale, Fla: Daniel Shoskes, MD (principal investigator); Kim Thomas; Martin Luther King Hospital, Los Angeles, Calif: Nand S. Datta, MD (principal investigator); Mary Ellen Raimo; Kawajalen Mervin; University of Arizona, Tucson: Craig V. Comiter, MD (principal investigator); Pat Conrad; University of Pennsylvania School of Medicine, Philadelphia: J. Richard Landis, PhD (principal investigator); Kathleen J. Propert, ScD; John T. Farrar, MD; Harold I. Feldman, MD, MS; Stephen Durborow, BS; Lori Fanelli, BA; Xueyou Hu, MS; Lee D. Randall, BA; Jill S. Knauss, MS; Randy Hilderbrand, MS; Gina Norwood, BS; Marie Durborow; Christopher Helker, RN, MPH; Michael Corby, MS; Benjamin E. Leiby, BA; The National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, Md: John W. Kusek, PhD (project officer); Leroy Nyberg, PhD, MD.

Controlling health expenditures is a major policy objective. Defining the burden of disease helps to identify the impact an illness has on society during a time when health care resources are becoming increasingly scarce. As economic evidence is becoming more important in medical decision making, it is critical to conduct rigorous cost evaluations to help determine the allocation of resources for chronic prostatitis based on empirical evidence. Concerns about the cost of health care and, consequently, the cost-effectiveness ratios of treatments have become almost as important as clinical effectiveness. Simply asking whether any treatment is effective is not the appropriate question. Rather, it is important to focus on the results for a set of outcomes and to compare these results with alternative treatments.

Currently, there is no "gold standard" for the treatment of chronic prostatitis. One of the goals of the CPCRN over the last 6 years has been to evaluate treatments in an effort to find efficacious treatments that will ultimately improve the lives of men with this condition. The CPCRN is currently completing a randomized clinical trial to evaluate 2 commonly prescribed therapies, antimicrobial agents and  $\alpha$ -adrenergic receptor antagonists. More studies are needed to determine what treatments are most effective for patients with what set of characteristics. Over the next 5 years, the CPCRN will be conducting a series of randomized clinical trials for evaluating novel therapies (ie, anti-inflammatory medications, pain medications, and medical devices). Another aspect of developing effective treatments for CPPS is studies looking at the etiology and pathogenesis of this condition. Since the cause of the symptoms is as yet unknown, therapies for CPPS are at this point all empiric. Thus, a parallel goal of the CPCRN is to further study the causes of CPPS to help decide what treatments to include in trials.

Successful answers to this question will permit more clinically effective and cost-effective ways to treat the population of patients with the difficult condition, CPPS. The results of our current study should prompt increased medical attention and resources to identify cost-effective treatment strategies for men with CPPS.

Accepted for publication July 16, 2003.

From the Department of Urology, Feinberg School of Medicine, Northwestern University, Chicago, Ill (Dr Calhoun); the General Medicine Unit, Medical Services, Massachusetts General Hospital, Boston (Dr Collins); the Department of Urology, Temple University School of Medicine, Philadelphia, Pa (Dr Pontari); the Department of Surgery, Harvard Medical School, and the Division of Urologic Surgery, Brigham and Women's Hospital, Boston, Mass (Dr O'Leary); the Center for Clinical Epidemiology and Biostatistics, University of Pennsylvania Medical Center, Philadelphia (Dr Landis and Mr Leiby); the Division of Kidney, Urologic, and Hematologic Diseases, National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health, Bethesda, Md (Dr Kusek); and the Departments of Urology and Health Services, University of California, Los Angeles (Dr Litwin).

This study was supported by grants U01 DK53736, U01 DK53752, U01 DK53732, U01 DK53730, U01 DK53734, and U01 from the National Institutes of Health/National Institutes of Diabetes and Digestive and Kidney Diseases.

This study was presented in part at the American Urological Association National Meeting; June 2001; Anaheim, Calif.

Corresponding author and reprints: Elizabeth A. Calhoun, PhD, Northwestern University, 339 E Chicago Ave, Room 802, Chicago, IL 60611 (e-mail: e-calhoun@northwestern.edu).

## REFERENCES

1. Collins MM, Stafford RS, O'Leary MP, Barry MJ. How common is prostatitis? a national survey of physician visits. *J Urol.* 1998;159:1224-1228.
2. Pfau A. Prostatitis: a continuing enigma. *Urol Clin North Am.* 1986;13:695-715.
3. Stamey TA. Urinary tract infections in males. In: Stamey TA, ed. *Pathogenesis and Treatment of Urinary Tract Infections.* Baltimore, Md: Williams & Wilkins; 1980:342-429.
4. Egan KJ, Kreiger JL. Chronic abacterial prostatitis: a urological chronic pain syndrome? *Pain.* 1997;69:213-218.
5. Nickel J. Effective office management of chronic prostatitis. *Urol Clin North Am.* 1998;25:677-684.
6. Kreiger JN, Egan KJ, Ross SO, Jacobs R, Berger RE. Chronic pelvic pains represent the most prominent urogenital symptoms of "chronic prostatitis." *Urology.* 1996;48:715-721.
7. McNaughton Collins M, MacDonald R, Wilt TJ. Diagnosis and treatment of chronic abacterial prostatitis: a systematic review. *Ann Intern Med.* 2000;133:367-381.
8. McNaughton-Collins M, Pontari MA, O'Leary MP, et al, and the Chronic Prostatitis Collaborative Research Network. Quality of life is impaired in men with chronic prostatitis. *J Gen Intern Med.* 2001;16:656-662.
9. Lipton RB, Stewart WF, Von Korff M. Burden of migraine: societal cost and therapeutic opportunities. *Neurology.* 1997;48(suppl 3):S4-S9.
10. Schaeffer AJ, Landis JR, Knauss JS, et al. Baseline demographics and clinical characteristics of men with chronic prostatitis: the NIH Chronic Prostatitis Cohort (CPC) study. *J Urol.* 2002;168:593-598.
11. Litwin MS, McNaughton-Collins M, Fowler F, et al, the Chronic Prostatitis Collaborative Research Network. The National Institutes of Health Chronic Prostatitis Symptom Index: development and validation of a new outcome measure. *J Urol.* 1999;162:369-375.
12. Clark AE, Zowall H, Levinton C, et al. Direct and indirect medical costs incurred by Canadian patients with rheumatoid arthritis: a 12 year study. *J Rheumatol.* 1997;24:1051-1060.
13. Revicki DA, Irwin D, Reblando J, Simon GE. The accuracy of self-reported disability days. *Med Care.* 1994;32:401-404.
14. Harlow SD, Linet MS. Agreement between questionnaire data and medical records: the evidence for accuracy of recall. *Am J Epidemiol.* 1989;129:233-248.
15. *Red Book.* Montvale, NJ: Medical Economics Co Inc; 1999.
16. Calhoun EA, Welshman EE, Chang CH, Fishman DA, Luran JR, Bennett CL. The costs associated with chemotherapy-induced toxicities. *Oncologist.* 2001;6:441-445.
17. US Census Bureau. *Statistical Abstract of the United States: 1999.* 119th ed. Washington, DC: US Dept of Commerce Economics and Statistics Administration, US Census Bureau; 1999.
18. SAS Institute Inc. *SAS/STAT User's Guide, Version 8.* Cary, NC: SAS Institute Inc; 1999:3884.
19. Table 3: national health expenditures aggregate and per capita amounts, percent distribution and average annual percent change by source of funds: selected calendar years 1980-2011. Available at: <http://www.cms.hhs.gov/statistics/nhe/projections-2001/t3.asp>. Accessed August 19, 2002.
20. Lubeck DP, Spitz PW, Fries JF, Wolfe F, Mitchell DM, Roth SH. A multicenter study of annual health service utilization and costs in rheumatoid arthritis. *Arthritis Rheum.* 1986;29:488-493.
21. Webster BS, Snook SH. The cost of compensable low back pain. *J Occup Med.* 1990;32:13-15.
22. Mathias SD, Kuppermann M, Liberman RF, Lipschultz RC, and Steege JF. Chronic pelvic pain: prevalence, health-related quality of life, and economic correlates. *Obstet Gynecol.* 1996;87:321-327.
23. Nickel JC, Downey J, Hunter D, Clark J. Prevalence of prostatitis-like symptoms in a population based study using the National Institutes of Health chronic prostatitis symptom index. *J Urol.* 2001;165:842-845.
24. Roberts RO, Lieber MM, Rhodes T, et al. Prevalence of a physician-assigned diagnosis of prostatitis: the Olmsted County study of urinary symptoms and health status among men. *Urology.* 1998;51:578-584.