
Prevalence of and Risk Factors for Prostatitis: Population Based Assessment Using Physician Assigned Diagnoses

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Purpose: Previous studies to assess risk factors for prostatitis used patient self-reported data and, therefore, they were subject to recall bias. We 1) used coded physician diagnoses to calculate the prevalence of prostatitis and 2) compared these patients with matched controls to identify medical conditions that are associated with prostatitis. Subjects were male enrollees in the Kaiser Permanente Northwest, Portland, Oregon health maintenance organization.

Materials and Methods: A computer search of the Kaiser Permanente Northwest administrative database was performed for May 1, 1998 to April 30, 2004 to identify men with a coded diagnosis of prostatitis. Prostatitis cases were each age matched with 3 controls and the medical diagnoses (using 3-digit International Classification of Diseases, 9th Revision codes) assigned to these 2 groups were compared.

Results: A prostatitis diagnosis was present in 4.5% of the male population. There were 37 diagnoses that were significantly more common in cases than in controls ($p < 0.0001$). Most of them were other urological codes to describe prostatitis symptoms, unexplained physical symptoms in other organ systems and psychiatric diagnoses. The strongest observed associations were with benign prostatic hyperplasia (OR 2.7), functional digestive disorders (OR 2.6), dyspepsia (OR 2.1), anxiety disorders (OR 2.0), other soft tissue disorders (OR 2.0), esophageal reflux (OR 1.8) and mood disorders (OR 1.8).

Conclusions: Prostatitis is a commonly diagnosed condition in the community setting, affecting approximately 1/22 men. The diagnosis is associated with multiple other unexplained physical symptoms and certain psychiatric conditions. Studies to explore possible biological explanations for these associations are needed.

Key Words: prostate, prostatitis, epidemiology, pelvic pain

The term prostatitis can be used to describe various clinical disorders. To limit confusion a classification system for prostatitis was developed under the auspices of the National Institutes of Health.¹ This classification system includes 4 categories, including I—acute bacterial prostatitis, II—chronic bacterial prostatitis, III—chronic prostatitis/ chronic pelvic pain syndrome and IV—asymptomatic inflammatory prostatitis. Type I prostatitis is an acute, febrile bacterial infection of the prostate that is accompanied by bacteriuria and pyuria. Type II prostatitis indicates recurrent, low grade bacterial infections of the prostate. The hallmarks of type II prostati-

tis are episodes of irritative voiding symptoms that are associated with bacteriuria and pyuria after prostate massage. Type III prostatitis refers to bothersome pelvic pain symptoms without identifiable etiology. Common symptoms are discomfort in the perineum, suprapubic region and penis, pain associated with sexual activity and bladder symptoms such as urinary frequency. Type IV prostatitis indicates prostate inflammation in the absence of symptoms, which is typically discovered during pathological analysis of prostate biopsy.

Based on physician survey data it was estimated that prostatitis diagnoses account for 2 million physician office visits annually in the United States, including 8% of all urology visits and 1% of primary care visits.² While this indicates that prostatitis is a common problem seen in physician offices, the prevalence of the condition (number of specific individuals with the diagnosis) is not well defined.

Previous case-control studies in prostatitis research cohorts examined risk factors for prostatitis.^{3,4} However, these analyses were based on patient self-report rather than on confirmed physician diagnoses. Therefore, they may have been subject to recall bias. We addressed these knowledge gaps using a comprehensive electronic medical record to provide a population based prevalence estimate

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of physician diagnosed prostatitis and assess which medical comorbidities are associated with a prostatitis diagnosis.

MATERIALS AND METHODS

The EpicCare clinical electronic medical record at KPNW was used to define the study population. KPNW is based in the Portland, Oregon metropolitan area, which includes southwest Washington State. Specific details about the KPNW patient population and the EpicCare database search protocol were previously published.⁵

Institutional review board approval was obtained from KPNW and Northwestern University before study initiation. An initial database search was performed to exclude certain subjects, including those who were younger than 25 or older than 80 years, those who were not current KPNW members at the time of analysis (May 2004) and those with dental coverage only. After applying these initial demographic exclusions there were 120,553 men in the study population.

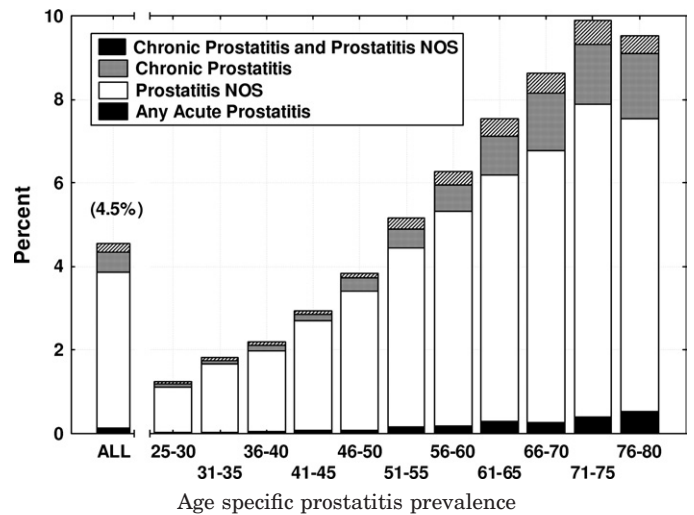
A review of the ICD-9 manual identified certain pertinent diagnostic codes that refer to prostatitis, including chronic prostatitis (601.1), prostatitis NOS (601.9), acute prostatitis (601.0), prostatocystitis (601.3), prostatitis in diseases classified elsewhere (601.4) and other specified inflammatory diseases of the prostate (601.8). The KPNW database search of diagnoses coded during encounters identified no patients coded with prostatocystitis, prostatitis in diseases classified elsewhere or other specified inflammatory diseases of the prostate. Using the remaining 3 ICD-9 codes overall and age specific prevalence rates were calculated for the 6-year period May 1, 1998 to April 30, 2004.

For the 5-year interval May 1, 1998 to April 30, 2003 each man identified with a prostatitis diagnosis was matched with 3 controls with no prostatitis diagnosis by age and duration in the health plan. The 100 most common diagnoses from the problem list in the medical record based on 3-digit ICD-9 codes were obtained for the prostatitis group. The prevalence rates of these diagnoses were compared between cases and controls using the chi-square test. Due to the large sample size relatively small differences between the groups could attain statistical significance. Therefore, only differences that were significant at $p \leq 0.0001$ are presented.

RESULTS

The database search for May 1, 1998 to April 30, 2004 yielded 171 men with a diagnosis of acute prostatitis, 847 with a diagnosis of chronic prostatitis and 4,781 with a diagnosis of prostatitis not otherwise specified. Table 1 lists

Diagnosis (ICD-9 code)	No. Pts (%)
Acute prostatitis (601.0)	113 (2.1)
Prostatitis NOS (601.9)	4,476 (81.7)
Chronic prostatitis (601.1)	578 (10.5)
Chronic prostatitis + prostatitis NOS	256 (4.7)
Acute prostatitis + prostatitis NOS	45 (0.82)
Acute prostatitis + chronic prostatitis	9 (0.16)
Acute prostatitis, prostatitis NOS + chronic prostatitis	4 (0.07)
Total	5,481 (100)



the distribution of coded diagnoses. There were 5,481 unique individuals identified, of whom 314 (5.7%) had multiple prostatitis diagnoses in the medical record. A diagnosis of acute prostatitis was infrequent, accounting for only 2.1% of the patients as an isolated diagnosis and 3.1% when present with other prostatitis diagnoses.

The prevalence of any prostatitis diagnosis was 4.5% (95% CI 4.38–4.62). The prevalence of acute prostatitis as an isolated diagnosis or combined with other prostatitis diagnoses was 0.14% (141/100,000 men). The figure shows age specific prostatitis prevalence rates. The prevalence increased progressively with age from a low of 1.25% in men 25 to 30 years old to 9.5% to 9.9% in the oldest age groups of 71 to 80 years.

To define the denominator for the population (120,553 men) KPNW membership was only required at 1 time point (May 2004). However, some of these men may not have been continuous members in the KPNW population throughout the entire study period (May 1998 through May 2004). Therefore, our prevalence estimate may have slightly underestimated the true prevalence. To address this question we examined those with continuous coverage from May 1, 1998 through May 1, 2003 (67,877 men). We identified 361 men with coded prostatitis diagnoses during this period, which yielded a prevalence of 4.95% (95% CI 4.74–5.06%). Although this value is statistically greater than the 4.5% value obtained for the entire population, the absolute difference is small.

For May 1, 1998 to April 30, 2003 there were 4,664 men with a prostatitis diagnosis in the medical record. These 4,664 cases were matched with 13,992 controls (3:1 ratio). When the 100 most common ICD-9 diagnoses in the prostatitis group were compared between cases and controls, 37 were seen more commonly in cases ($p < 0.0001$). Table 2 lists the distribution of these diagnoses. For clarification purposes 6 of the 37, 3-digit ICD-9 categories were analyzed to the 5-digit level. No diagnoses were less common in cases than in controls.

Of the 37 diagnoses 7 appeared to represent other codes used to document patient prostatitis symptoms, including other disorders of the bladder, other disorders of the urethra and urinary tract, symptoms involving the urinary system, other disorders of the male genital organs, other disorders of

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