

Urologic Disease Burden in the United States: Veteran Users of Department of Veterans Affairs Healthcare

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OBJECTIVES	To determine the disease burden, measured by resource utilization, of four urologic conditions among veteran users of U.S. Department of Veterans Affairs (VA) healthcare services and to assess variations by selected sociodemographic characteristics.
METHODS	We applied expert-derived diagnosis clusters to establish four patient cohorts from a population of U.S. veterans aged 18 years and older with at least one outpatient visit in a VA healthcare facility in fiscal year 2001 (n = 3,691,519): (1) benign prostatic hyperplasia/lower urinary tract symptoms (BPH/LUTS), (2) kidney stones (KS), (3) urinary tract infections (UTI), and (4) urinary incontinence (UI). We identified patients with qualifying diagnosis codes associated with outpatient visits in the national VA Outpatient Clinic file, thereby generating case counts for each diagnostic category.
RESULTS	Among veteran users of VA healthcare services, when defined as the primary reason for the visit, the prevalence of BPH/LUTS was 4811 per 100,000 veterans (4.8%); the prevalence of KS was 597 per 100,000 (0.6%); the prevalence of UTI was 4265 and 1719 per 100,000 female and male veterans, respectively (4.3% and 1.7%); and the prevalence of UI was 2161 and 515 per 100,000 female and male veterans, respectively (2.2% and 0.5%). Prevalence of these conditions when ascertained by capturing diagnoses appearing as secondary reasons for a physician visit was much higher.
CONCLUSIONS	Although we expected the prevalence of urologic conditions to be high among veterans who use the VA system for care, we found the burden of urologic disease among veterans to be comparable to other national data sets. Prevalence estimates based on primary diagnosis, rather than secondary or "any" diagnosis, significantly underestimated the disease burden among veterans. UROLOGY 72: 37–41, 2008. © 2008 Elsevier Inc.

Urologic disease encompasses a wide variety of conditions of the genitourinary tract that affect individuals at all stages of life. Estimates from existing data sources suggest that urologic diseases account for well over \$20 billion in healthcare costs per year in the United States alone.¹ However, lack of a systematic approach to assessing available data has placed urologic health outside the principal healthcare and quality improvement initiatives that have been forwarded by the Institute of Medicine² and the National Committee

for Quality Assurance³ in favor of conditions that have been more thoroughly studied.

In response to this gap in knowledge, the National Institute of Diabetes, Digestive and Kidney Diseases designed and subsequently funded the Urologic Diseases in America (UDA) Project to create a synthesis of existing data concerning the burden of urologic disease. The goal of the UDA Project was to use the best available data sources throughout the United States to create the first national compendium that delineates changes in the epidemiology, practice patterns, and health and economic impact for urologic diseases that fall within the scope of urologic practice.¹ This omnibus has provided the necessary evidence base for identifying variations in prevalence and practice that, in turn, have served as the foundation for generating evidence-based strategic planning for public and private funding of basic, clinical, and health services research.

Veterans are a national cohort at risk for a variety of common urologic problems. The U.S. Department of

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Veterans Affairs (VA) is the largest healthcare system in the United States, comprising more than 160 VA hospitals and more than 600 community-based outpatient clinics. According to the 2000 U.S. Census, veterans constitute approximately 13% of the U.S. population, numbering 26.5 million men and women.⁴ Overall the VA also serves more than 75% of all disabled and low-income veterans nationwide.⁴ As such, veteran users of VA healthcare have substantially lower physical and mental health scores than veteran non-users or their civilian counterparts.^{5,6} Given the demographic profile of U.S. veterans, we hypothesized that the VA healthcare system would bear a large burden of urologic disease. Specifically, we hypothesized that urologic diseases would be more prevalent among veterans than their civilian counterparts, at least partially because veterans of all ages do not face access-to-care issues associated with a lack of health insurance.

To test our hypothesis, we turned to resources available through the UDA Project to examine prevalence among veteran users of the VA healthcare system of four major urologic conditions: (1) benign prostatic hyperplasia/lower urinary tract symptoms (BPH/LUTS), (2) urolithiasis or kidney stones (KS), (3) urinary tract infections (UTI), and (4) urinary incontinence (UI). Though we later expanded to all of the most common urologic conditions, herein we report on the first four conditions analyzed by the UDA Project. We also aimed to describe the extent of variations in these conditions by age, by gender (where appropriate), and by race/ethnicity. As used in this context, "prevalence" refers to disease burden expressed through use of healthcare resources, as opposed to "population-based" prevalence.

MATERIAL AND METHODS

Institutional review board approval was obtained through the University of California-Los Angeles and the Sepulveda VA in the greater Los Angeles area. The VA maintains a centralized data repository for the entire VA healthcare system, providing a comprehensive resource to examine burden. Each VA medical center sends computerized excerpts of every healthcare encounter to the Austin Automation Center, where centralized SAS file extracts are created. For these analyses, we focused on the VA Outpatient Clinic files, which are patient-level databases organized by fiscal year (FY) and include demographics, type of visit, clinic stops and, since 1997, outpatient diagnoses.

We examined four urologic conditions: BPH/LUTS, KS, UTI, and UI. Physician experts derived inclusion and exclusion ICD-9 (International Classification of Diseases, 9th revision) diagnosis code-based criteria for each urologic condition. These algorithms in turn were reviewed and refined by nationally recognized experts in urology. We identified patients with qualifying diagnosis codes associated with outpatient visits from October 1, 2000 through September 30, 2001 (FY 2001) in the national VA Outpatient Clinic file, thereby generating case counts for each diagnostic category.

The population studied included all U.S. veterans aged 18 years and older with at least one outpatient visit in any VA healthcare facility nationwide in FY 2001 ($n = 3,691,519$). We

eliminated redundant patients seen at more than one facility to arrive at unique patient counts for our denominators. We first identified the base population at risk in the same year (male veterans aged 40+ years for BPH; male and female patients aged 18+ years for other conditions). We used similar approaches to stratify disease burden by risk categories, including age, gender, and race/ethnicity. We also examined the differences in case counts according to use of primary diagnosis (the main reason for the specific encounter) versus any listed diagnoses (secondary diagnoses that are not the chief reason for a patient's visit). We measured prevalence as the number of existing cases per 100,000 unique outpatients.

RESULTS

Among veteran users of VA healthcare services, the prevalence among patients aged 40 years and older with a primary diagnosis of BPH/LUTS was 4811 per 100,000 unique patients in FY 2001 (4.8%; *Table 1*). The number of patients diagnosed with KS was much lower, at 605 cases per 100,000; there were 570 and 381 cases per 100,000 patients for men and women, respectively (0.6% and 0.4%). Urinary tract infections were more than twice as common among women veterans compared with men (4265 female and 1719 male UTIs per 100,000; *Fig. 1*). This was owing to the high frequency of visits for cystitis among women. The prevalence of outpatient visits for pyelonephritis was only slightly higher in women. Urinary incontinence was more than four times more prevalent among women than men (2161 female and 515 male UIs per 100,000; *Fig. 1*).

We measured the absolute number of cases as another means to assess disease burden. Benign prostatic hyperplasia/lower urinary tract symptoms had the highest absolute burden, with nearly 160,000 cases identified in 2001 alone (*Table 1*). Although visits for UTIs were more frequent among women veterans, there were more than 60,000 men with an outpatient visit for a UTI in the same year and only 7000 such women. Similar patterns existed for UI, whereby the high prevalence rate was not associated with a number of cases because women represented only 5% to 7% of the user population during that time period.

We also examined the impact of defining prevalence according to visits for which the condition of interest was a primary diagnosis (the primary reason for the encounter) versus defining prevalence according to visits for which the condition was a secondary diagnosis (found in any diagnosis position in the outpatient records). Prevalence based on "any" diagnosis resulted in significantly higher rates for each condition. The highest increases were for female urinary incontinence, for which use of "any diagnosis" nearly doubled the estimated prevalence (from 2.2% to 3.8%), and BPH/LUTS, which increased by 136% (from 4.8% to 11.4%; *Table 1*). Using "any" diagnosis had the least impact on female KS and UTIs.

The age distribution for each of these urologic conditions varied by disease. Benign prostatic hyperplasia/lower urinary tract symptoms increased linearly with age,

Table 1. Overview of prevalence of selected urologic conditions among U.S. veteran users of Veterans Health Administration facilities in fiscal year 2001 (primary and all diagnoses)

Urologic Condition and Subconditions	Unweighted Frequency (no. of cases)		Base Population (no. of SSN per strata)	Rate per 100,000 (no. of cases per 100,000 unique outpatients)	
	Primary Diagnosis	All Diagnoses		Primary Diagnosis	All Diagnoses
BPH/LUTS	159,325	377,701	3,311,450	4811	11,406
Urinary tract stones	22,055	35,376	3,691,533	597	958
Upper tract stones	20,717	33,702	3,691,533	561	913
Lower tract stones	2107	2748	3,691,533	57	74
UTI					
Adult female UTI (18+ yr)	7033	9156	164,906	4265	5552
Cystitis	773	1033	164,906	469	626
Pyelonephritis	105	129	164,906	64	78
Other	6404	8369	164,906	3883	5075
Adult Male UTI (18+ yr)	60,622	82,326	3,526,627	1719	2334
Cystitis	3911	5671	3,526,627	111	161
Pyelonephritis	1397	2105	3,526,627	40	60
Orchitis	3482	11,780	3,526,627	99	334
Other	47,644	65,891	3,526,627	1351	1868
UI					
Adult female UI (18+ yr)	3563	6196	164,906	2161	3757
Stress incontinence	3545	6174	164,906	2150	3744
Fistulae	22	32	164,906	13	19
Adult male UI (18+ yr)	18,149	34,377	3,526,627	515	975

SSN = social security numbers; BPH/LUTS = benign prostatic hyperplasia/lower urinary tract symptoms; UTI = urinary tract infection; UI = urinary incontinence.

Source: Outpatient Clinic File (OPC), VA Austin Automation Center (fiscal year 2001).

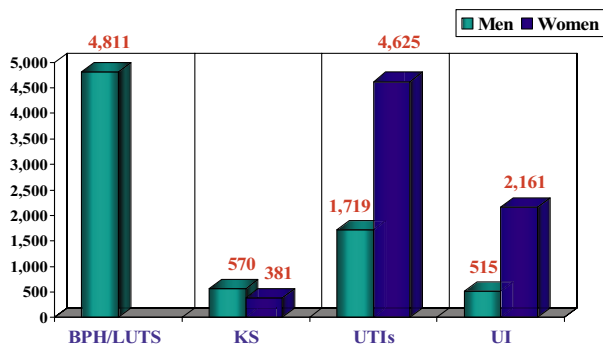


Figure 1. Prevalence of BPH, KS, UTIs, and UI among Veteran Users of VA Health Care.

from 808 to 7136 per 100,000 for age 40 to 44 years versus age 85+ years age groups, with a small decline for patients aged 85 years and older. The age distribution for patients with KS was roughly normally distributed, with peak prevalence among 45- to 64-year-olds (838/100,000). There was no significant variation in the prevalence of UTIs by age. Urinary incontinence in men increased with age, from 87 per 100,000 for men aged 25 years and younger to 1365 per 100,000 for men aged 85 or more years. However, UI rates rose at a much earlier age for women veterans than for male veterans.

Our examination of racial/ethnic differences revealed that Hispanic veterans had the highest prevalence of BPH/LUTS and KS, followed by white veterans (Table 2). Among women veterans, Hispanic women had the highest UTI rates, whereas Hispanic and black male veterans had the highest UTI rates among men. White female veterans had the highest rates of UI, whereas black

Table 2. Racial/ethnic variations in prevalence of BPH, KS, UTI, and UI among VA users (no. of unique cases per 100,000 outpatients)

	White	Black	Hispanic	Other	Unknown
BPH	5889	5126	6131	4302	3481
KS	762	470	918	692	346
UTI					
Female	5322	4942	5666	3620	3048
Male	2139	2912	2888	1764	925
UI					
Female	3283	1680	2511	2530	1272
Male	688	876	571	536	251

KS = kidney stones. Other abbreviations as in Table 1.

women had the lowest, a pattern that is reversed for male veterans.

COMMENT

Our study had several important findings. Each of the four urologic diseases studied poses a large burden on the health of both female and male veterans and on the healthcare system caring for them. However, we found the utilization rates for each of the four diseases among veterans to be similar to data from the National Ambulatory Medical Care Survey (NAMCS), a national sample of data collected from non-federally employed physicians engaged in direct patient care.⁷ This contradicts our hypothesis that veterans, who have full access to healthcare resources through the VA, might have been more likely to use more resources and therefore have higher rates of utilization (a phenomenon known as "moral hazard"⁸). Many veterans receiving care in the

VA system seek additional care outside of the VA system and therefore may be newly diagnosed with a condition, such as an acute episode of renal colic from a kidney stone, elsewhere. This might explain why the use of “any” (secondary) diagnoses resulted in a lower prevalence for each disease compared with other utilization studies.

Benign prostatic hyperplasia/lower urinary tract symptoms was identified in 11.4% of veterans older than 40 years, including men with both a primary and secondary diagnosis, with a linear increase in prevalence with age. This utilization rate was lower than that in NAMCS (14.5%).⁹ Data from the Massachusetts Male Aging Study showed the prevalence of BPH, as identified by clinical diagnosis or history of surgery for BPH, to range from 8.4% in men aged 40 to 49 years to 33.5% in men aged 60 to 70 years.^{9,10} This linear increase in age was similar to that seen in our study. We also found a higher prevalence of BPH/LUTS among Hispanic veterans, followed by white and black veterans. In a comparison of data from the Olmsted County Study of Urinary Symptoms and Health Status and the Flint Men’s Health Study, Sarma *et al.* found that 34% of white men reported moderate/severe LUTS compared with 41% of black men¹¹—a finding that contrasts with our findings for black and white men. The black men in the Flint study may have lacked access to care such as that provided by the VA, explaining the worse symptoms among those men.

Primary diagnoses of UTIs were more than twice as common among women veterans compared with men (4265 female and 1719 male UTIs per 100,000), yet prevalence was high in both men and women. The NAMCS data from 2000 similarly reported a rate of 6013 per 100,000 (6.0%) office visits by women with a primary diagnosis of UTI and a rate of 1342 per 100,000 (1.3%) visits by men.^{12,13} The rates of outpatient care-seeking for stone disease as a primary diagnosis among veterans (597 per 100,000 [0.6%]) also compared closely to rates from NAMCS (668 per 100,000 population [0.7%]) in the year 2000.⁹

The utilization rates for a primary diagnosis of UI were similar between the VA system (2.2% for women and 0.5% for men) and NAMCS (1.1% for women and 1.1% for men). However, rates in both datasets were lower than expected, given the very high prevalence of the condition in the community.^{14–17} The differences in clinical utilization rates and community-based questionnaire data are likely due to the fact that the majority of people with incontinence do not seek treatment for it.¹⁷ Interestingly, the racial distribution of UI in the VA system paralleled that found by the 1999 to 2001 National Health and Nutrition Examination Survey (NHANES)^{14–17}; white women and black men had the highest prevalence. This may be due to more stress incontinence among white women and more urge incontinence among blacks.¹⁴

This study faces a number of important limitations.

First, the diagnosis codes in the VA databases may have variable accuracy. The VA healthcare providers are not reimbursed for specific diagnoses or treatment and therefore may have less incentive to accurately code all conditions.¹⁸ Second, race/ethnicity data in the VA administrative datasets are based historically on observation, which may result in misclassification. Race/ethnicity is also missing in many records, and missing data rates are sometimes as high as 30%, biased toward complete data for patients with a history of hospitalization. Furthermore, regional differences in race/ethnicity may explain some of the variability we identified. For example, if there are more Hispanics in the southern United States, the higher prevalence of stone disease in Hispanics may be attributed to location and weather rather than ethnicity. Additionally, the comparisons we made with data from NAMCS should be interpreted with a degree of caution because the data were obtained in a different manner, and physicians who participated in NAMCS may have been more thorough in coding the primary and secondary diagnoses, resulting in higher prevalence rates. Nonetheless, the urologic disease burden here provides a portrait of the annual impact on the VA system.

CONCLUSIONS

This study represents a national assessment of the disease burden of common urologic conditions among veteran users of the VA healthcare system. The urologic disease burden among veteran users of VA healthcare services is high and poses a significant burden not only among veterans but to the VA healthcare system responsible for caring for them. We found that use of primary diagnosis in these administrative datasets significantly underestimated urologic disease burden. The aging of veteran users will only further increase the urologic disease burden. At this early juncture, more research is needed on patterns of care and quality in terms of disease detection, diagnosis, treatment, and health outcomes in VA settings.

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EDITORIAL COMMENT

Epidemiology of genitourinary disorders is a field of research that has recently received increased attention. To encourage this much needed scientific work, the National Institute of Diabetes, Digestive, and Kidney Diseases developed and funded the Urologic Diseases in America Project. Numerous urologists

and health services researchers have worked with the lead scientific team to produce a comprehensive analysis of existing high-quality national data regarding multiple disorders in our specialty. These studies have shaped our understanding of the associated burdens placed on our healthcare delivery systems regarding practice patterns, economic effects, and other measures of resource use.

This study presents a 1-year snapshot of the prevalence and associated use of Veterans Affairs (VA) system resources for four common urologic disorders, including benign prostatic hyperplasia and lower urinary tract symptoms, kidney stones, urinary tract infections, and urinary incontinence. These cover a broad cross-section of disorders seen in general urologic practice. The observed use rates were similar to non-VA settings according to data sources such as the National Ambulatory Medical Care Survey. However, these conditions represent only a fraction of the available VA data. In future studies, it will be interesting to see how the VA compares with outside systems for other conditions such as urologic malignancies. As the authors note, many veterans with additional third-party insurance coverage receive care in non-VA settings, and some access both VA and private care systems.

Epidemiologic and health services research present unique design and implementation challenges. This particular study underscores the importance of diagnostic and procedural coding accuracy. The isolated use of primary diagnosis codes might significantly underestimate the overall prevalence of genitourinary diseases compared with an examination of all codes for a given individual. However, this also helps us understand the issues related to undertreatment. Urinary incontinence is a good example, for which the rates for the primary diagnostic codes might be low compared with the data from community prevalence surveys. This indicates that incontinent patients might not actively seek care for their condition. As models of healthcare delivery and reimbursement evolve, coding accuracy will become even more critical. Many public health policies designed to enhance clinical outcomes, such as pay-for-performance models, rely heavily on accurate claims data. Missing data can also create significant problems for research, despite the use of advanced statistical techniques to model and correct for these factors.

The effect of aging on the prevalence of many urologic disorders cannot be ignored. This study showed significant relationships between age and both benign prostatic hyperplasia and lower urinary tract symptoms and urinary incontinence. However, as the demographics of the United States veteran population shift, the patterns of urologic disease prevalence and resource use within the VA system will also likely change. Continued military activity both here and abroad will result in growing numbers of young veterans entering the VA system. The numbers of women in active-duty service have increased, and this will lead to an even greater need for both primary and specialty women's healthcare. It will be most interesting to watch how disease and care trends in the VA system change in the future.

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