

CHAPTER 19

Urinary Tract Infection in Men

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Contents

INTRODUCTION.....623
DEFINITION AND DIAGNOSIS.....623
RISK FACTORS623
PREVALENCE AND INCIDENCE.....625
TRENDS IN HEALTHCARE RESOURCE UTILIZATION ... 627
 Inpatient Care.....627
 Outpatient Care632
 Emergency Room.....635
 Nursing Homes637
ECONOMIC IMPACT638
SPECIAL CONSIDERATIONS642
CONCLUSIONS643
RECOMMENDATIONS645

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INTRODUCTION

Although urinary tract infections (UTI) occur in both men and women, clinical studies suggest that the overall prevalence of UTI is higher in women. Basic concepts related to the definition and diagnosis of UTI, associated risks of morbidity and mortality, and general treatment principles are reviewed in the introduction to the chapter on UTI in Women. This chapter addresses resource utilization, epidemiology, and costs of UTI in adult men.

DEFINITION AND DIAGNOSIS

Clinical

The clinical definitions of general UTI, including bacteriuria, cystitis, and pyelonephritis, are reviewed in the introduction to the chapter on UTI in women. As described above, male anatomic structures that may be involved with infectious processes include the prostate, testis, scrotum, and epididymis.

Analytic

Analyses presented in this chapter used ICD-9 diagnostic codes for UTI (Table 1). These codes are based primarily on the site and type of infection involved.

RISK FACTORS

Unlike the epidemiology of UTI in females, rates are much lower in young adults and rise dramatically in older men. Indeed, several potential

risk factors for the development of UTI are unique to men. Bladder outlet obstruction due to benign prostatic hyperplasia (BPH) may be associated with urinary stasis. Even though a causal relationship has been difficult to prove, chronic prostatic obstruction is thought to increase the risk of UTI in older men with BPH. Instrumentation of the urinary tract may lead to iatrogenic UTI, either from cystoscopy or catheterization, both of which are common in the evaluation of men with obstructive voiding symptoms. UTI is an uncommon complication of transrectal prostate biopsy. Complications may range from acute prostatitis and cystitis to more complex infections, including pyelonephritis, osteomyelitis, and systemic urosepsis. The most common associated organisms are gastrointestinal flora, including anaerobes. Most clinicians utilize antimicrobial prophylaxis around the time of the procedure. Fluoroquinolones are particularly effective for this condition.

Bacterial prostatitis, which may be acute or chronic, is an uncommon clinical problem. Several forms of prostatitis are recognized in the National Institutes of Health (NIH) classification system (1). Acute bacterial prostatitis (Type I) is characterized by rapid onset of symptoms, including fever and associated constitutional signs and symptoms. Urine cultures are typically positive, and intravenous antimicrobial therapy is often indicated. In contrast, chronic bacterial prostatitis (Type II) tends to be less pronounced in onset, with patients remaining asymptomatic between recurrent episodes. Recurrent cystitis is common. This is most likely due to persistence of pathogenic organisms in the prostatic

Table 1. Codes used in the diagnosis and management of male urinary tract infection**Males 18 years or older with one of the following ICD-9 codes:****Orchitis**

016.5	Tuberculosis of other male genital organs
072.0	Mumps orchitis
603.1	Infected hydrocele
604.0	Orchitis epididymitis and epididymo-orchitis with abscess
604.9	Other orchitis, epididymitis, and epididymo-orchitis, without mention of abscess
604.90	Orchitis and epididymitis, unspecified
604.99	Other orchitis epididymitis and epididymo-orchitis without abscess
608.4	Other inflammatory disorders of male genital organs
608.0	Seminal vesiculitis

Cystitis

112.2	Candidiasis of other urogenital sites
120.9	Schistosomiasis, unspecified
595.0	Acute cystitis
595.1	Chronic interstitial cystitis
595.2	Other chronic cystitis
595.3	Trigonitis
595.89	Other specified types of cystitis
595.9	Cystitis, unspecified

Pyelonephritis

590.0	Chronic pyelonephritis
590.00	Chronic pyelonephritis without lesion of renal medullary necrosis
590.01	Chronic pyelonephritis with lesion of renal medullary necrosis
590.1	Acute pyelonephritis
590.10	Acute pyelonephritis without lesion of renal medullary necrosis
590.11	Acute pyelonephritis with lesion of renal medullary necrosis
590.2	Renal and perinephric abscess
590.3	Pyeloureteritis cystica
590.8	Other pyelonephritis or pyonephrosis, not specified as acute or chronic
590.9	Infection of kidney, unspecified
593.89	Other specified disorders of kidney and ureter

Other

597.8	Other urethritis
599.0	Urinary tract infection site not specified
607.2	Other inflammatory disorders of penis
607.1	Balanoposthitis

secretory system. Coliform bacterial species, particularly *Enterococcus fecalis* and *Escherichia coli*, are the most common organisms in cases of chronic bacterial prostatitis. Nonbacterial prostatitis (Type III), also known as chronic pelvic pain syndrome, is a condition characterized by chronic pelvic pain that is attributed to the prostate. Patients may also complain of obstructive and irritative urinary symptoms, sexual dysfunction, and penile, testicular, or groin pain. Chronic pelvic pain syndrome may be associated with increased concentrations of inflammatory cells in prostatic secretions, despite the absence of documentable bacterial infection.

The pathogenesis of prostatitis may be multifactorial. Reflux of infected urine into the prostatic ducts in the posterior urethra occurs in some patients, while ascending urethral infection plays a role in others. Hematogenous and lymphatic spread have also been hypothesized as possible causes. Reflux of noninfected urine may be associated with cases of nonbacterial prostatitis. It is hypothesized that this intraprostatic reflux of urine may lead to histochemical inflammatory changes in the absence of bacteria.

Prostatic abscess is a localized infection in the prostate. Patients at increased risk for development of prostatic abscesses include diabetics and men who are immunocompromised. Urethral instrumentation and chronic indwelling catheters may also increase risk. Historically, prostatic abscesses were caused by *Neisseria gonorrhoea*. Today, however, most cases are associated with coliform organisms, *Pseudomonas spp.*, and anaerobic organisms.

Urethritis and epididymitis are generally painful conditions caused by bacterial infection of the urethra and epididymis, respectively. Both disorders may be acute or chronic. These are considered separately in the chapter on sexually transmitted diseases (STDs).

Orchitis is often associated with bacterial epididymitis. Isolated bacterial orchitis is less common. Mumps orchitis represents a specific form of the disease; it occurs in about 30% of mumps cases in postpubertal boys. The acute inflammation that occurs in these cases may lead to testicular atrophy and subsequent infertility. Other forms of orchitis include tuberculous orchitis, gangrenous orchitis, and testicular inflammation associated with infected hydroceles. In older men, most orchitis is probably

related to bacterial UTI; however, in younger men, it usually represents a complication of sexually transmitted urethritis. These differences explain some of the demographic differences in hospitalization rates for orchitis noted later in this chapter. Orchitis is also addressed in the chapters on STDs and pediatric UTIs.

Scrotal infections may involve only the scrotal skin or may also include deeper structures. Fournier's gangrene is a severe form of scrotal infection associated with necrotizing fasciitis. Predisposing risk factors include diabetes, immunosuppression, poor perineal hygiene, and perirectal or perianal infections. Cultures typically yield mixed flora with both aerobic and anaerobic species. The risk of mortality with Fournier's gangrene is high because the infection can spread quickly along the layers of the abdominal wall that are contiguous with the scrotum. Aggressive surgical debridement and intravenous antimicrobial therapy are indicated.

PREVALENCE AND INCIDENCE

Approximately 20% of all UTIs occur in men. Between 1988 and 1994, the overall lifetime prevalence of UTI in men was estimated to be 13,689 cases per 100,000 adult men, based on the National Health and Nutrition Examination Survey (NHANES-III) (Tables 2 and 3). In comparison, the estimate for women was 53,067 cases per 100,000 adult women during the same time period (Chapter 6, Table 2).

Data from US Veterans Health Administration (VA) facilities supports the higher prevalence of UTI in women compared to men (Chapter 6, Figure 1 and Table 4). Between 1999 and 2001, the overall prevalence of UTI as a primary diagnosis in veterans seeking outpatient care was 2.3 to 2.48 times greater in women than it was in men. Rates of orchitis were generally higher than either cystitis or pyelonephritis when considered as either the primary or any diagnosis. Rates of UTI increased with age in this cohort and were higher in African American men than in other racial/ethnic groups (Table 4). The VA data show that overall rates of outpatient visits associated with a primary diagnosis of UTI among adult male veterans dropped steadily between 1999 and 2001; this trend was most pronounced for older

Table 2. Male lifetime prevalence of urinary tract infections, by socio-demographic group, count, rate^a

	Count	Rate
Total count ^b	11,892,613	13,689
1–2 Bladder infections ever	8,983,769	10,341
3+ Bladder infections ever	2,908,845	3,348
Mean number of infections in the last 12 months of those ever having UTI	0.26	...
Race/ethnicity		
White non-Hispanic	9,864,439	14,458
Black non-Hispanic	932,376	10,326
Hispanic	909,324	13,229
Other	186,474	6,782
Region		
Midwest	3,327,654	15,899
Northeast	2,379,704	13,285
South	4,319,184	14,625
West	1,866,072	10,085
Urban/rural		
MSA	5,585,151	8,688
Non-MSA	6,307,463	27,919

...data not available.

MSA, metropolitan statistical area.

^aRate per 100,000 based on 1991 population estimates from Current Population Survey (CPS), CPS Utilities, Unicon Research Corporation, for relevant demographic categories of US male adult civilian non-institutionalized population.

^bThe data in this table are based on the weighted number of persons who responded “1 or more” to question HAK4: “How many times have you had a bladder infection, also called urinary tract infection, UTI or cystitis?”

NOTE: Counts may not sum to total due to rounding.

SOURCE: National Health and Nutrition Examination Survey III, 1988–1994.

Table 3. Male incidence of UTI in past 12 months, by socio-demographic group, count, rate^a

	Count	Rate
Total count ^b	2,013,448	2,318
1 or more bladder infections in the last 12 months	2,013,448	2,318
Mean number of infections in the last 12 months	1.5	0
Age		
18–24	111,205	920
25–34	374,050	1,789
35–44	251,245	1,336
45–54	302,969	2,419
55–64	239,659	2,394
65–74	432,123	5,303
75–84	242,354	6,693
85+	59,842	7,754
Race/ethnicity		
White non-Hispanic	1,505,602	2,207
Black non-Hispanic	209,061	2,315
Hispanic	180,689	2,629
Other	118,096	4,295
Region		
Midwest	495,025	2,365
Northeast	334,275	1,866
South	846,422	2,866
West	337,725	1,825
Urban/rural		
MSA	837,678	1,303
Non-MSA	1,175,769	5,204

MSA, metropolitan statistical area.

^aRate per 100,000 based on 1991 population estimates from Current Population Survey (CPS), CPS Utilities, Unicon Research Corporation, for relevant demographic categories of US male adult civilian non-institutionalized population.

^bThe data in this table are based on the weighted number of persons who responded “1 or more” to question HAK5: “How many of these infections did you have during the past 12 months?”

NOTE: Counts may not sum to total due to rounding.

SOURCE: National Health and Nutrition Examination Survey III, 1988–1994.

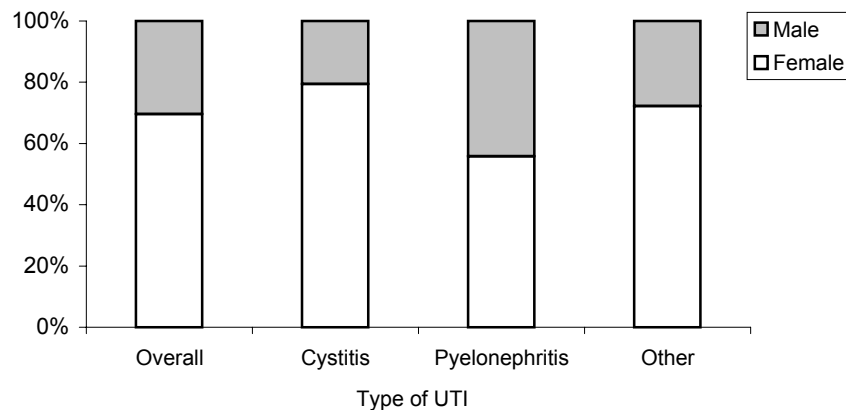


Figure 1. Percent contribution of males and females to types of urinary tract infections, 1999–2001.

SOURCE: Outpatient Clinic File (OPC), VA Austin Automation Center, 1999–2001.

men and occurred across all racial/ethnic groups and geographic regions.

TRENDS IN HEALTHCARE RESOURCE UTILIZATION

Antimicrobial therapy is the primary mode of treatment for most patients with UTI. Antimicrobial selection is tailored on the basis of culture and susceptibility data following the initiation of empiric therapy. Selection of antimicrobials is guided by the severity and location of the individual infection and by consideration of regional and local epidemiological data on bacterial resistance.

Healthcare providers treat patients with UTI in a variety of clinical settings. This section examines trends in treatment patterns for male UTI at different sites of service.

Inpatient Care

Inpatient care with administration of intravenous antimicrobials may be required to treat men with severe UTI. Increased patient age appears to be associated with an increased rate of inpatient treatment for UTI in men. Data from the Centers for Medicare and Medicaid Services (CMS) from 1992 to 1998 reveal that across all years of study, the rates of inpatient care for men 65 years of age and older are approximately 1.7 times those of men younger than 65 (Table 5). The younger group comprises primarily

those who qualified for Medicare because of disability or end-stage renal disease. The risk appears to increase significantly with age; rates more than double in men aged 85 and older. For example, the rate of inpatient care in 1992 for men 85 to 94 years of age was 1,678 per 100,000 (95% CI, 1649–1706) compared with 777 per 100,000 (95% CI, 768–786) for men aged 75 to 84, and 308 per 100,000 (95% CI, 304–312) for men 65 to 74. This trend was similar in 1995 and 1998. Increased use of inpatient care may be associated with more severe infections in older men due to increased comorbidity and changes in immune response associated with increased age. In the time period covered by the Medicare data, rates of inpatient hospitalization for male UTI care were about 1.5 times higher in African Americans than in Caucasians or Hispanics (counts in Asians and North American Natives were too low to produce reliable estimates of rates). The rate of inpatient utilization was somewhat higher in the South than in other regions.

Data for 1994 to 2000 from the Healthcare Cost and Utilization Project (HCUP) reveal that the rates of inpatient hospital care for men with a primary diagnosis of UTI at any anatomic location have been relatively stable for young and middle-aged men (18 to 64 years) and for men between ages 65 and 74 (Table 6). In contrast, the rates of hospitalization for men in the 75- to 84-year age group have slowly declined, while the rates for men over 85 have gradually increased over time. The rates of inpatient care increase steadily with

Table 4. Frequency of urinary tract infection^a as a diagnosis in male VA patients seeking outpatient care, rate^b

	1999		2000		2001	
	Primary Diagnosis	Any Diagnosis	Primary Diagnosis	Any Diagnosis	Primary Diagnosis	Any Diagnosis
Total	2,082	2,705	1,963	2,591	1,719	2,334
Age						
18–24	1,351	1,475	1,429	1,620	1,586	1,731
25–34	1,524	1,803	1,545	1,796	1,415	1,673
35–44	1,663	2,022	1,634	1,995	1,492	1,867
45–54	1,725	2,179	1,707	2,184	1,538	2,017
55–64	2,013	2,623	1,894	2,499	1,695	2,267
65–74	2,172	2,901	1,986	2,698	1,654	2,308
75–84	2,695	3,581	2,361	3,211	1,979	2,786
85+	3,983	5,317	3,540	4,733	2,975	4,321
Race/ethnicity						
White	2,553	3,311	2,411	3,167	2,139	2,881
Black	3,313	4,287	3,172	4,077	2,912	3,841
Hispanic	3,111	4,118	2,935	3,989	2,888	4,052
Other	2,088	2,642	1,763	2,351	1,764	2,338
Unknown	1,101	1,438	1,058	1,430	925	1,295
Region						
Midwest	1,989	2,606	1,892	2,503	1,578	2,132
Northeast	1,784	2,304	1,646	2,128	1,449	1,910
South	2,349	3,104	2,188	2,966	1,918	2,681
West	2,103	2,640	2,043	2,608	1,861	2,471
Insurance status						
No insurance/self-pay	1,994	2,552	1,929	2,486	1,716	2,271
Medicare/Medicare supplemental	2,560	3,412	2,254	3,087	1,928	2,702
Medicaid	2,455	2,972	2,188	2,846	2,287	2,998
Private insurance/HMO/PPO	1,700	2,234	1,534	2,036	1,280	1,760
Other insurance	1,830	2,338	1,868	2,361	1,519	2,039
Unknown	5,540	7,405	4,692	5,768	1,168	1,550

HMO, health maintenance organization; PPO, preferred provider organization.

^aRepresents diagnosis codes for male UTIs (including cystitis, pyelonephritis, orchitis, and other UTIs).

^bRate is defined as the number of unique patients with each condition divided by the base population in the same fiscal year x 100,000 to calculate the rate per 100,000 unique outpatients.

NOTE: Race/ethnicity data from clinical observation only, not self-report; note large number of unknown values.

SOURCE: Outpatient Clinic File (OPC), VA Austin Automation Center, 1999–2001.

Table 5. Inpatient stays by male Medicare beneficiaries with urinary tract infection listed as primary diagnosis, count^a, rate^b (95% CI)

	1992		1995		1998	
	Count	Rate	Count	Rate	Count	Rate
Total ^c	74,320	505 (501–508)	72,820	478 (475–482)	70,480	487 (483–490)
Total < 65	9,960	322 (316–329)	10,940	318 (312–323)	10,840	315 (310–321)
Total 65+	64,360	553 (549–557)	61,880	526 (521–530)	59,640	540 (536–544)
Age						
65–74	22,300	308 (304–312)	19,980	278 (274–282)	17,320	269 (265–274)
75–84	27,440	777 (768–786)	26,180	716 (707–724)	26,180	715 (706–724)
85–94	13,260	1,678 (1,649–1,706)	14,560	1,716 (1,689–1,744)	14,760	1,705 (1,678–1,732)
95+	1,360	1,752 (1,659–1,844)	1,160	1,415 (1,334–1,495)	1,380	1,579 (1,496–1,661)
Race/ethnicity						
White	60,820	490 (486–494)	59,680	459 (455–463)	57,180	468 (464–471)
Black	9,780	768 (752–783)	10,100	729 (715–744)	9,800	734 (720–749)
Asian	...	...	180	247 (211–283)	380	277 (249–305)
Hispanic	...	...	1,000	504 (472–535)	1,560	465 (442–488)
N. American Native	...	...	140	696 (582–810)	340	1,216 (1,087–1,345)
Region						
Midwest	18,200	491 (484–498)	18,720	486 (479–493)	18,480	500 (493–507)
Northeast	15,460	488 (480–495)	13,900	437 (430–444)	13,820	497 (489–506)
South	31,620	604 (597–610)	30,720	560 (554–566)	28,500	531 (525–537)
West	8,260	368 (360–376)	8,340	360 (352–367)	8,260	369 (361–377)

... data not available.

^aUnweighted counts multiplied by 20 to arrive at values in the table.

^bRate per 100,000 Medicare beneficiaries in the same demographic stratum.

^cPersons of other races, unknown race and ethnicity, and other region are included in the totals.

NOTE: Counts less than 600 should be interpreted with caution.

SOURCE: Centers for Medicare and Medicaid Services, MedPAR and 5% Carrier File, 1992, 1995, 1998.

age, more than doubling with each decade beyond age 55. In this analysis, Asian men had the lowest rates of inpatient hospitalization for UTI care, followed by Hispanics and Caucasians. African American men had the highest rates of inpatient utilization. When analyzed by region, the lowest rates of inpatient care were seen in the West, while rates were similar in other geographic regions. Rates of inpatient care were similar in urban and rural settings. It is unclear why estimated inpatient utilization rates are lower in HCUP data than in CMS data.

Data from HCUP also reveal that approximately 10% of all inpatient care for UTI in men is for the treatment of orchitis (Table 7). Between 1994 and 2000, the overall rate of inpatient care for the treatment of orchitis was relatively stable, ranging

from 12 to 14 per 100,000 population. Rates appear to rise gradually with age, the most significant increases occurring between 65 and 85 years of age. Inpatient utilization rates for elderly men decreased somewhat in 2000 compared to prior years. African American men had the highest rates of inpatient utilization for treatment of orchitis, and Asian men had the lowest rates. Inpatient utilization rates were slightly lower in the West than in other regions, and there was no significant difference between rates in urban and rural locations. The mean length of stay for inpatient hospitalizations in men with a primary diagnosis of UTI decreased from 6.5 days in 1994 to 5.1 days in 2000 (Table 8). Consistent with the general trend toward decreased use of inpatient care, this observation in men with UTI was noted across all age groups and

Table 6. Inpatient hospital stays by adult males with urinary tract infection (any anatomic location) listed as primary diagnosis, count, rate^a (95% CI)

	1994			1996			1998			2000		
	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate
Total ^b	115,258	131 (126–135)	111,680	121 (117–126)	118,193	125 (121–130)	121,367	126 (122–130)				
Age												
18–24	2,475	20 (18–23)	2,129	17 (15–20)	2,139	17 (15–19)	1,983	15 (13–17)				
25–34	6,670	33 (31–36)	6,124	31 (28–33)	5,344	28 (26–30)	5,045	28 (25–30)				
35–44	8,525	43 (40–46)	9,114	43 (40–46)	8,956	41 (39–43)	8,764	40 (38–42)				
45–54	9,830	70 (66–74)	9,748	63 (59–67)	10,324	62 (59–66)	11,165	63 (59–66)				
55–64	12,394	129 (121–137)	11,840	119 (112–126)	13,327	126 (119–133)	13,360	120 (113–126)				
65–74	25,188	320 (304–336)	23,215	284 (269–299)	24,256	301 (286–317)	24,374	303 (289–318)				
75–84	32,866	867 (828–905)	32,246	765 (729–800)	33,885	747 (717–777)	35,667	738 (709–767)				
85+	17,309	1,931 (1,830–2,031)	17,265	1,996 (1,890–2,101)	19,962	2,025 (1,932–2,119)	21,010	2,054 (1,968–2,140)				
Race/ethnicity												
White	68,442	101 (97–105)	68,319	98 (94–102)	68,032	97 (93–101)	68,899	97 (93–100)				
Black	13,583	147 (136–158)	13,334	138 (128–148)	12,935	130 (121–139)	12,488	122 (113–131)				
Asian/Pacific Islander	813	33 (26–40)	919	29 (24–34)	1,153	34 (29–39)	1,629	46 (40–52)				
Hispanic	5,699	69 (61–78)	6,067	67 (58–77)	6,947	69 (61–77)	7,982	77 (71–83)				
Region												
Midwest	25,498	122 (112–132)	25,542	119 (111–126)	26,933	124 (114–133)	26,666	119 (111–127)				
Northeast	24,955	138 (128–148)	23,501	130 (119–141)	23,233	128 (119–137)	24,625	136 (127–145)				
South	47,476	160 (151–168)	44,858	141 (133–149)	48,656	147 (140–154)	49,021	144 (137–151)				
West	17,329	88 (80–97)	17,779	87 (79–94)	19,371	91 (82–100)	21,055	98 (90–105)				
MSA												
Rural	26,408	118 (109–127)	26,148	126 (117–135)	25,469	121 (113–129)	26,675	125 (117–133)				
Urban	88,714	135 (129–140)	85,413	120 (115–125)	92,416	126 (121–131)	94,578	126 (122–131)				

MSA, metropolitan statistical area.

^aRate per 100,000 based on 1994, 1996, 1998, 2000 population estimates from Current Population Survey (CPS), CPS Utilities, Unicon Research Corporation, for relevant demographic categories of US male adult civilian non-institutionalized population.

^bPersons of other races, missing or unavailable race and ethnicity, and missing MSA are included in the totals.

NOTE: Counts may not sum to totals due to rounding.

SOURCE: Healthcare Cost and Utilization Project Nationwide Inpatient Sample, 1994, 1996, 1998, 2000.

Table 7. Inpatient hospital stays by adult males with orchitis listed as primary diagnosis, count, rate^a (95% CI)

	1994			1996			1998			2000		
	Count	Rate		Count	Rate		Count	Rate		Count	Rate	
Total ^b	12,322	14 (13–15)		11,363	12 (12–13)		11,941	13 (12–13)		12,174	13 (12–13)	
Age												
18–24	614	5.0 (4.0–6.1)		454	3.7 (2.8–4.6)		584	4.7 (3.8–5.6)		532	4.1 (3.2–4.9)	
25–34	2,058	10 (9.0–11)		1,548	7.8 (6.7–8.8)		1,428	7.4 (6.4–8.4)		1,312	7.2 (6.2–8.2)	
35–44	2,207	11 (10–12)		2,390	11 (10–13)		2,481	11 (10–13)		2,469	11 (10–12)	
45–54	1,848	13 (11–15)		1,928	12 (11–14)		2,100	13 (11–14)		2,446	14 (12–15)	
55–64	1,610	17 (14–19)		1,431	14 (13–16)		1,710	16 (14–18)		1,786	16 (14–18)	
65–74	1,964	25 (22–28)		1,896	23 (21–26)		1,674	21 (18–23)		1,865	23 (20–26)	
75–84	1,570	41 (36–47)		1,305	31 (27–35)		1,509	33 (29–38)		1,384	29 (25–33)	
85+	451	50 (37–64)		411	47 (36–59)		454	46 (36–57)		379	37 (28–46)	
Race/ethnicity												
White	6,545	10 (8.9–10)		6,333	9.1 (8.5–9.8)		6,437	9.2 (8.5–9.8)		6,216	8.7 (8.0–9.4)	
Black	1,896	21 (18–23)		1,647	17 (15–20)		1,571	16 (14–18)		1,613	16 (14–18)	
Asian/Pacific Islander	*	*		*	*		*	*		*	*	
Hispanic	773	9.4 (7.1–12)		788	8.7 (7.3–10)		910	9.0 (7.0–11)		1,241	12 (10–14)	
Region												
Midwest	2,720	13 (12–15)		2,874	13 (12–15)		2,752	13 (11–14)		2,650	12 (10–13)	
Northeast	3,297	18 (16–20)		2,714	15 (13–17)		2,536	14 (12–16)		2,543	14 (12–16)	
South	4,456	15 (13–17)		4,226	13 (12–14)		4,796	14 (13–16)		4,920	14 (13–16)	
West	1,850	9.4 (8.1–11)		1,549	7.6 (6.5–8.6)		1,858	8.7 (7.1–10)		2,061	10 (8.1–11)	
MSA												
Rural	2,686	12 (10–14)		2,527	12 (11–14)		2,551	12 (11–14)		2,397	11 (10–13)	
Urban	9,589	15 (14–16)		8,829	12 (12–13)		9,340	13 (12–14)		9,759	13 (12–14)	

*Figure does not meet standard of reliability or precision.

MSA, metropolitan statistical area.

^aRate per 100,000 based on 1994, 1996, 1998, 2000 population estimates from Current Population Survey (CPS), CPS Utilities, Unicon Research Corporation, for relevant demographic categories of US male adult civilian non-institutionalized population.

^bPersons of other races, missing or unavailable race and ethnicity, and missing MSA are included in the totals.

NOTE: Counts may not sum to totals due to rounding.

SOURCE: Healthcare Cost and Utilization Project Nationwide Inpatient Sample, 1994, 1996, 1998, 2000.

Table 8. Trends in mean inpatient length of stay (days) for adult males hospitalized with urinary tract infection listed as primary diagnosis

	Length of Stay			
	1994	1996	1998	2000
Total	6.5	5.4	5.1	5.1
Age				
18–24	4.4	3.9	3.6	3.4
25–34	4.9	4.2	4.0	4.2
35–44	5.2	4.6	4.1	4.4
45–54	5.4	4.8	4.5	4.8
55–64	5.9	4.9	4.8	4.8
65–74	6.3	5.3	5.0	5.1
75–84	7.2	6.0	5.5	5.4
85+	7.8	6.3	5.8	5.6
Race/ethnicity				
White	6.3	5.4	5.0	5.1
Black	7.5	6.3	5.9	5.7
Asian/Pacific Islander	7.1	5.5	5.6	5.4
Hispanic	6.1	5.3	5.2	5.0
Other	5.9	6.5	4.7	5.4
Region				
Midwest	6.0	5.1	4.9	4.8
Northeast	8.2	7.0	5.9	5.7
South	6.0	5.1	4.9	5.2
West	5.9	4.8	4.6	4.5
MSA				
Rural	5.7	5.0	4.6	4.6
Urban	6.7	5.6	5.2	5.2

MSA, metropolitan statistical area.

SOURCE: Healthcare Cost and Utilization Project Nationwide Inpatient Sample, 1994, 1996, 1998, 2000.

geographic regions, and in both rural and urban hospitals.

Outpatient Care

Outpatient care for UTI in men is administered in a variety of clinical settings, including hospital outpatient clinics, physician offices, ambulatory surgery centers, and emergency rooms. Each of these settings was analyzed separately.

Hospital Care

Data from the National Hospital Ambulatory Medical Care Survey (NHAMCS) from 1994 to 2000 reveal that hospital outpatient visits by men with UTI

Table 9. Hospital outpatient visits by adult males with urinary tract infection, count, rate^a (95% CI)

	Primary Reason		Any Reason	
	Count	Rate	Count	Rate
1994	73,571	83 (44–122)	154,900	175 (92–259)
1996	73,508	80 (33–127)	83,579	91 (44–138)
1998	128,629	136 (80–193)	163,573	173 (110–237)
2000	119,557	124 (62–186)	152,422	159 (91–226)

^aRate per 100,000 based on 1994, 1996, 1998, 2000 population estimates from Current Population Survey (CPS), CPS Utilities, Unicon Research Corporation, for relevant demographic categories of US male adult civilian non-institutionalized population.

SOURCE: National Hospital Ambulatory Medical Care Survey—Outpatient, 1994, 1996, 1998, 2000.

listed as any of the reasons for the visit have been variable (Table 9), ranging from 91 to 175 per 100,000. When UTI was listed as the primary reason for the hospital patient visit, the rates increased from 80 per 100,000 (95% CI, 33–127) in 1996 to 136 per 100,000 (95% CI, 80–193) in 1998. The rate in 2000 dropped slightly, to 124 per 100,000 (95% CI, 62–186). These data suggest that there has been a general trend toward increased outpatient care for UTI in men. This complements the observed decreases in inpatient care noted above.

Hospital outpatient visit data from CMS reveal a similar increase in utilization during the past decade (Table 10). Among Medicare beneficiaries at least 65 years old, rates of hospital outpatient visits for men with UTI rose from 191 per 100,000 (95% CI, 189–194) in 1992 to 301 per 100,000 (95% CI, 298–304) in 1995, and 362 per 100,000 (95% CI, 358–365) in 1998. The most dramatic increases were observed in the oldest elderly men. In those 95 years of age and older, the rates of hospital outpatient visits more than doubled between 1992 and 1995 and doubled again between 1995 and 1998. Rates of hospital outpatient visits for UTI care in men were highest in the Midwest and South, and the rates in both regions have increased over time. In the years for which complete data regarding racial/ethnic differences in outpatient hospital utilization were available (1995 and 1998), Hispanic men had the highest rates of utilization, followed by African American men. In 1998, the rates for Hispanic men were 1.23 and 1.80 times higher than those for African Americans and Caucasians, respectively (counts in

Table 10. Hospital outpatient visits by male Medicare beneficiaries with urinary tract infection listed as primary diagnosis, count^a, rate^b (95% CI)

	1992		1995		1998	
	Count	Rate	Count	Rate	Count	Rate
Total ^c	28,580	194 (192–196)	46,020	302 (300–305)	51,720	357 (354–360)
Total < 65	6,300	204 (199–209)	10,560	307 (301–312)	11,760	342 (336–348)
Total 65+	22,280	191 (189–194)	35,460	301 (298–304)	39,960	362 (358–365)
Age						
65–74	10,080	139 (137–142)	14,920	208 (204–211)	16,920	263 (259–267)
75–84	9,340	264 (259–270)	14,020	383 (377–390)	15,800	432 (425–438)
85–94	2,700	342 (329–355)	6,160	726 (708–744)	6,460	746 (728–764)
95+	160	206 (174–238)	360	439 (394–484)	780	892 (830–954)
Race/ethnicity						
White	18,540	149 (147–152)	33,160	255 (252–258)	40,560	332 (328–335)
Black	6,280	493 (481–505)	9,060	654 (641–668)	6,460	484 (472–496)
Asian	...	...	160	220 (185–254)	480	350 (319–381)
Hispanic	...	...	1,520	766 (727–804)	2,000	596 (570–622)
N. American Native	...	...	580	2,883 (2,649–3,116)	700	2,504 (2,321–2,686)
Region						
Midwest	8,460	228 (223–233)	12,780	332 (326–337)	15,160	410 (403–416)
Northeast	6,860	216 (211–221)	6,780	213 (208–218)	7,680	276 (270–283)
South	8,400	160 (157–164)	19,580	357 (352–362)	21,440	399 (394–405)
West	3,960	176 (171–182)	6,240	269 (262–276)	7,240	324 (316–331)

...data not available.

^aUnweighted counts multiplied by 20 to arrive at values in the table.

^bRate per 100,000 Medicare beneficiaries in the same demographic stratum.

^cPersons of other races, unknown race and ethnicity, and other region are included in the totals.

NOTE: Counts less than 600 should be interpreted with caution.

SOURCE: Centers for Medicare and Medicaid Services, 5% Carrier and Outpatient Files, 1992, 1995, 1998.

Asians were too low to produce reliable estimates of rates). The reason for this observed difference is unclear.

Physician Offices

The majority of UTIs in both men and women are treated in physicians' offices. According to data from the National Ambulatory Medical Care Survey (NAMCS), more than 1,896,000 physician office visits that included a diagnosis of UTI were made in 2000 by men in the United States (Table 11). Of these visits, more than 1,290,000 were for a primary diagnosis of UTI. Fluctuations in rates of utilization have been observed over time, with peaks occurring in 1992 and 1996. In these years, the observed rates of physician office visits for UTI in men aged 55 and older were

significantly higher than those for younger men. This likely reflects the higher incidence and prevalence of UTI in older men. The reasons for the dramatic increases in 1992 and 1996 are unclear but may be related to coding anomalies.

Medicare data for outpatient physician office visits for men with UTI indicate that rates of utilization remained relatively stable throughout the 1990s (Table 12). Rates were consistently highest in men in the 85- to 94-year age group, followed by those aged 75 to 84 (Figure 2). Rates in the most elderly cohort (95 and older) were similar to the overall mean. Regional variations in Medicare physician outpatient visits for men with UTI appear to have diminished over time and were least pronounced in 1998. As in the NHAMCS data, Hispanic men had the highest rates

Table 11. Physician office visits by adult males with urinary tract infection, count, rate^a (95% CI)

	1992			1994			1996			1998			2000		
	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate	
Total	1,992,546	2,268 (1,598–2,938)	1,111,037	1,259 (889–1,629)	2,163,849	2,353 (1,601–3,105)	1,664,141	1,765 (1,060–2,470)	1,290,406	1,342 (854–1,830)					
Age															
18–54	1,067,943	1,642 (964–2,320)	682,612	1,033 (652–1,414)	1,147,995	1,669 (913–2,425)	845,264	1,205 (582–1,828)	819,947	1,153 (568–1,738)					
55+	924,603	4,050 (2,340–5,760)	428,425	1,932 (993–2,872)	1,015,854	4,379 (2,412–6,346)	*	*	470,459	1,879 (1,013–2,745)					
Total	2,372,185	2,700 (1,997–3,402)	1,594,515	1,807 (1,368–2,245)	2,652,548	2,884 (2,093–3,675)	2,105,332	2,232 (1,447–3,018)	1,896,810	1,973 (1,377–2,568)					
Age															
18–54	1,203,792	1,851 (1,149–2,553)	831,728	1,258 (843–1,674)	1,243,005	1,807 (1,041–2,574)	971,180	1,384 (731–2,038)	1,153,805	1,623 (915–2,330)					
55+	1,168,393	5,118 (3,297–6,939)	762,787	3,441 (2,209–4,673)	1,409,543	6,076 (3,910–8,241)	*	*	743,005	2,967 (1,876–4,058)					

*Figure does not meet standard for reliability or precision.

^aRate per 100,000 based on 1992, 1994, 1996, 1998, 2000 population estimates from Current Population Survey (CPS), CPS Utilities, Unicon Research Corporation, for relevant demographic categories of US male adult civilian non-institutionalized population.

NOTE: Counts may not sum to totals due to rounding.

SOURCE: National Ambulatory Medical Care Survey—Outpatient, 1992, 1994, 1996, 1998, 2000.

Table 12. Physician office visits by male Medicare beneficiaries with urinary tract infection listed as primary diagnosis, count^a, rate^b (95% CI)

	1992		1995		1998	
	Count	Rate	Count	Rate	Count	Rate
Total ^c	524,880	3,564 (3,555–3,574)	540,200	3,549 (3,540–3,559)	498,620	3,444 (3,435–3,453)
Total < 65	62,880	2,035 (2,019–2,051)	75,040	2,178 (2,163–2,193)	71,420	2,078 (2,063–2,093)
Total 65+	462,000	3,970 (3,959–3,981)	465,160	3,951 (3,939–3,962)	427,200	3,869 (3,858–3,880)
Age						
65–74	231,780	3,202 (3,190–3,215)	231,720	3,224 (3,211–3,237)	197,840	3,078 (3,065–3,092)
75–84	177,880	5,037 (5,014–5,060)	180,140	4,925 (4,903–4,947)	173,720	4,744 (4,723–4,766)
85–94	49,700	6,289 (6,235–6,342)	50,300	5,929 (5,879–5,980)	52,980	6,119 (6,069–6,170)
95+	2,640	3,400 (3,273–3,528)	3,000	3,659 (3,530–3,787)	2,660	3,043 (2,928–3,157)
Race/ethnicity						
White	446,400	3,599 (3,589–3,610)	464,380	3,572 (3,562–3,582)	425,500	3,480 (3,469–3,490)
Black	47,140	3,700 (3,667–3,733)	48,560	3,507 (3,476–3,538)	40,760	3,054 (3,025–3,083)
Asian	...	...	2,400	3,293 (3,164–3,422)	4,700	3,427 (3,331–3,523)
Hispanic	...	...	9,740	4,906 (4,811–5,001)	14,980	4,463 (4,393–4,533)
N. American Native	...	...	520	2,584 (2,366–2,803)	440	1,574 (1,427–1,720)
Region						
Midwest	126,780	3,418 (3,399–3,436)	125,900	3,266 (3,248–3,284)	113,680	3,074 (3,056–3,092)
Northeast	86,280	2,721 (2,703–2,739)	93,300	2,934 (2,915–2,952)	83,440	3,002 (2,982–3,022)
South	223,640	4,270 (4,252–4,287)	220,600	4,021 (4,005–4,038)	210,400	3,920 (3,904–3,937)
West	76,500	3,405 (3,381–3,429)	83,260	3,590 (3,567–3,614)	76,820	3,435 (3,411–3,459)

... data not available.

^aUnweighted counts multiplied by 20 to arrive at values in the table.

^bRate per 100,000 Medicare beneficiaries in the same demographic stratum.

^cPersons of other races, unknown race and ethnicity, and other region are included in the totals.

NOTE: Counts less than 600 should be interpreted with caution.

SOURCE: Centers for Medicare and Medicaid Services, 5% Carrier and Outpatient Files, 1992, 1995, 1998.

of physician office utilization among the racial/ethnic groups analyzed.

Ambulatory Surgery

Visits to ambulatory surgery centers represent a small percentage of Medicare visits for men with UTI (Table 13). Among Medicare beneficiaries at least 65 years old, rates ranged from 83 per 100,000 in 1992 (95% CI, 82–85) to 93 per 100,000 in 1995 (95% CI, 92–95) and 95 per 100,000 in 1998 (95% CI, 93–97). Rates were lower and more stable among younger Medicare beneficiaries who qualified because of disability or end-stage renal disease. As with Medicare physician office visits, the highest rates were observed in men 75 to 94 years of age. Rates were highest in the Midwest and Northeast and lowest in the South and West. The reasons for these geographic differences

are unclear. No clear racial/ethnic differences were observed in this analysis. The low rates of utilization for ambulatory surgery centers indicate that this is not a primary site of service for men with UTI. The cases identified likely represent perioperative UTI in men scheduled for outpatient surgery.

Emergency Room

Patients with UTI may present to an emergency room (ER) for initial evaluation and management. Data from NHAMCS indicate approximately 424,700 ER visits by men with a primary diagnosis of UTI in 2000 (Table 14). The overall rate of utilization in 2000 was 442 per 100,000, which is similar to the rate of 420 per 100,000 observed in 1994. Lower rates of ER utilization in this population were observed in 1996 and 1998. The rates of ER utilization by male Medicare

Table 13. Visits to ambulatory surgery centers by male Medicare beneficiaries with urinary tract infection listed as primary diagnosis, count^a, rate^b (95% CI)

	1992		1995		1998	
	Count	Rate	Count	Rate	Count	Rate
Total ^c	11,120	76 (74–77)	12,860	84 (83–86)	12,200	84 (83–86)
Total < 65	1,420	46 (44–48)	1,860	54 (52–56)	1,720	50 (48–52)
Total 65+	9,700	83 (82–85)	11,000	93 (92–95)	10,480	95 (93–97)
Age						
65–74	5,400	75 (73–77)	5,880	82 (80–84)	4,940	77 (75–79)
75–84	3,500	99 (96–102)	4,200	115 (111–118)	4,460	122 (118–125)
85–94	780	99 (92–106)	860	101 (95–108)	1,040	120 (113–127)
95+	20	26 (14–37)	60	73 (55–91)	40	46 (32–59)
Race/ethnicity						
White	9,680	78 (76–80)	11,280	87 (85–88)	10,820	88 (87–90)
Black	780	61 (57–66)	1,100	79 (75–84)	940	70 (66–75)
Asian	...	...	100	137 (110–165)	20	15 (8.0–21)
Hispanic	...	...	100	50 (40–60)	240	72 (63–80)
N. American Native	...	...	...	...	20	72 (39–104)
Region						
Midwest	3,420	92 (89–95)	3,960	103 (100–106)	3,880	105 (102–108)
Northeast	2,940	93 (89–96)	3,000	94 (91–98)	3,000	108 (104–112)
South	3,840	73 (71–76)	4,540	83 (80–85)	3,960	74 (71–76)
West	880	39 (37–42)	1,240	53 (50–56)	1,260	56 (53–59)

... data not available.

^aUnweighted counts multiplied by 20 to arrive at values in the table.

^bRate per 100,000 Medicare beneficiaries in the same demographic stratum.

^cPersons of other races, unknown race and ethnicity, and other region are included in the totals.

NOTE: Counts less than 600 should be interpreted with caution.

SOURCE: Centers for Medicare and Medicaid Services, 5% Carrier and Outpatient Files, 1992, 1995, 1998.

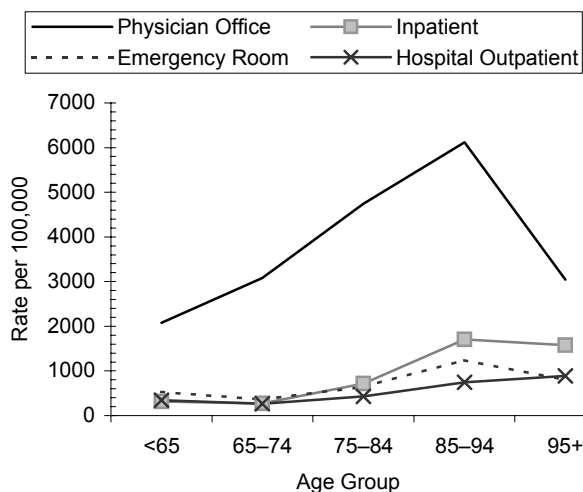


Figure 2. Trends in visits by males with urinary tract infection listed as primary diagnosis by patient age and site of service, 1998.

SOURCE: Centers for Medicare and Medicaid Services, 1998.

Table 14. Emergency room visits by adult males with urinary tract infection listed as primary diagnosis, count, rate^a (95% CI)

	Count	Rate
1994	370,637	420 (320–520)
1996	296,377	322 (232–412)
1998	322,937	342 (245–440)
2000	424,705	442 (325–559)

^aRate per 100,000 based on 1994, 1996, 1998, 2000 population estimates from Current Population Survey (CPS), CPS Utilities, Unicon Research Corporation, for relevant demographic categories of US male adult civilian non-institutionalized population.

SOURCE: National Hospital Ambulatory Medical Care Survey—ER, 1994, 1996, 1998, 2000.

Table 15. Emergency room visits by male Medicare beneficiaries with urinary tract infection listed as primary diagnosis, count^a, rate^b (95% CI)

	1992		1995		1998	
	Count	Rate	Count	Rate	Count	Rate
Total ^c	74,500	506 (502–510)	78,220	514 (510–518)	76,280	527 (523–531)
Total < 65	15,100	489 (481–496)	17,680	513 (506–521)	18,320	533 (525–541)
Total 65+	59,400	510 (506–515)	60,540	514 (510–518)	57,960	525 (521–529)
Age						
65–74	26,440	365 (361–370)	24,200	337 (333–341)	23,000	358 (353–362)
75–84	22,960	650 (642–659)	25,040	685 (676–693)	23,540	643 (635–651)
85–94	9,140	1,156 (1,133–1,180)	10,360	1,221 (1,198–1,245)	10,720	1,238 (1,215–1,262)
95+	860	1,108 (1,034–1,181)	940	1,146 (1,073–1,220)	700	801 (741–860)
Race/ethnicity						
White	58,080	468 (464–472)	60,220	463 (460–467)	58,820	481 (477–485)
Black	12,200	958 (941–974)	14,820	1,070 (1,053–1,087)	13,040	977 (960–994)
Asian	...	...	140	192 (161–224)	300	219 (194–244)
Hispanic	...	...	1,300	655 (620–690)	2,240	667 (640–695)
N. American Native	...	...	120	596 (492–701)	300	1,073 (951–1,195)
Region						
Midwest	17,820	480 (473–487)	18,140	471 (464–477)	19,600	530 (523–537)
Northeast	12,720	401 (394–408)	13,660	430 (422–437)	12,140	437 (429–445)
South	33,080	632 (625–638)	36,740	670 (663–677)	34,240	638 (631–645)
West	9,680	431 (422–439)	8,500	367 (359–374)	8,980	402 (393–410)

... data not available.

^aUnweighted counts multiplied by 20 to arrive at values in the table.

^bRate per 100,000 Medicare beneficiaries in the same demographic stratum.

^cPersons of other races, unknown race and ethnicity, and other region are included in the totals.

NOTE: Counts less than 600 should be interpreted with caution.

SOURCE: Centers for Medicare and Medicaid Services, 5% Carrier and Outpatient Files, 1992, 1995, 1998.

beneficiaries were somewhat higher, ranging from 506 per 100,000 (95% CI, 502–510) in 1992 to 527 per 100,000 (95% CI, 523–531) in 1998 (Table 15). In this analysis, utilization rates were consistently highest in the next-to-oldest cohort (85 to 94 years of age), followed closely by the oldest men (those 95 and older). Rates of ER utilization by older men were nearly twice those of men younger than 85 years of age. This may represent increased severity of infection in elderly men prompting evaluation in the ER. Rates of ER utilization in this cohort were consistently highest in the South. Again, the reason for the geographic variation is unclear. African American men had rates of ER utilization twice as high as those of Caucasians in this analysis (Figure 3). The lowest rates were observed in Asian men.

Nursing Homes

Information regarding UTI in men living in nursing home facilities was obtained from the National Nursing Home Survey of 1995, 1997, and 1999 (Tables 16–18). The overall rates for men with either an admitting or current diagnosis of UTI in this sample appear stable over time, ranging from 5,642 per 100,000 in 1997 (95% CI, 4,641–6,642) to 5,803 per 100,000 in 1995 (95% CI, 4,794–6,812). It is interesting to note that the rates of UTI for men living in nursing homes are closer to those for women than are the rates for the community-dwelling cohorts, as discussed in the chapter on UTI in Women (see Chapter 6, Tables 21–23). No clear trends were observed over time with regard to age in male nursing home residents. In all years studied, about half of male nursing home residents required special assistance using the toilet,

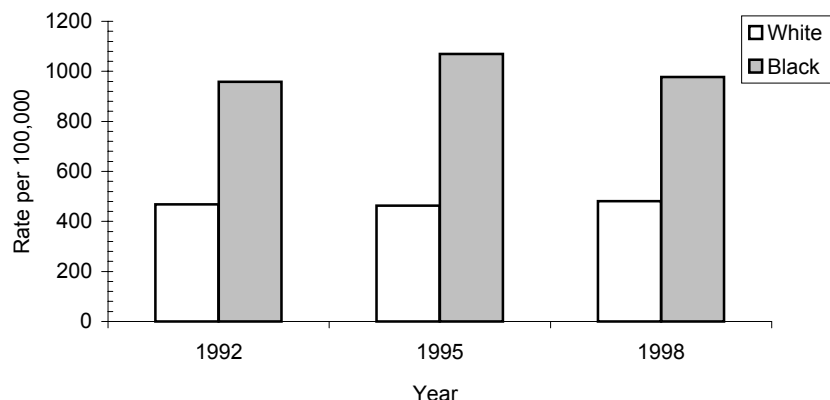


Figure 3. Rate of emergency room visits for males with urinary tract infection listed as primary diagnosis by patient race and year.

SOURCE: Centers for Medicare and Medicaid Services, 5% Carrier and Outpatient Files, 1992, 1995, 1998.

regardless of whether they had a UTI (Table 18). In 1997, only 39% of men with UTI required special assistance using the toilet, but this survey item was skipped at a much higher rate that year, making its results difficult to interpret (Table 17). Men with UTI had higher rates of incontinence than did the general cohort of male nursing home residents. It is not clear whether UTI or urinary incontinence is the causal factor.

The rates of indwelling catheter and ostomy use in male nursing home residents have remained stable at 11.9% in 1995 and 11.3% in 1999 (Table 18). This is

of concern because of the well-established association between indwelling catheter use and urinary tract colonization and infection. Although these rates of catheter and ostomy use are not dramatic, they are higher than the 7.9 to 9.1% range observed in female nursing home residents. (see Chapter 6, Table 23).

ECONOMIC IMPACT

Direct Costs

Urinary tract infections in men are associated with a significant economic cost. Adjusted mean

Table 16. Male nursing home residents with an admitting or current diagnosis of urinary tract infection, count, rate^a (95% CI)

	1995		1997		1999	
	Count	Rate	Count	Rate	Count	Rate
Total ^b	24,404	5,803 (4,794–6,812)	25,063	5,642 (4,641–6,642)	26,229	5,743 (4,761–6,724)
Age						
18–74	8,223	5,746 (4,046–7,445)	9,158	6,011 (4,302–7,720)	9,552	5,860 (4,266–7,455)
75–84	8,017	5,554 (3,886–7,223)	7,082	4,408 (2,956–5,859)	9,438	6,311 (4,397–8,225)
85+	8,164	6,135 (4,244–8,026)	8,822	6,723 (4,629–8,817)	7,239	5,020 (3,440–6,600)
Race						
White	18,678	5,500 (4,403–6,597)	19,029	5,364 (4,258–6,470)	18,455	5,070 (4,052–6,087)
Other	5,508	6,973 (4,453–9,493)	5,704	6,637 (4,252–9,021)	7,558	8,349 (5,608–11,089)

^aRate per 100,000 male nursing home residents in the same demographic stratum.

^bPersons of unspecified race are included in the total.

SOURCE: National Nursing Home Survey, 1995, 1997, 1999.

Table 17. Special needs of male nursing home residents with urinary tract infection, count, rate^a (95% CI)

Category	1995		1997		1999	
	Count	Rate	Count	Rate	Count	Rate
Has indwelling foley catheter or ostomy						
Yes	6,925	28,375 (20,204–36,546)	8,960	357,50 (26,693–44,806)	6,880	26,229 (18,779–33,680)
No	17,479	71,625 (63,454–79,796)	16,103	64,250 (55,194–73,307)	19,349	73,771 (66,320–81,221)
Question left blank	0	0	0	0	0	0
Requires assistance using the toilet						
Yes	12,388	50,761 (41,692–59,830)	9,869	39,377 (30,473–48,280)	14,214	54,192 (45,293–63,092)
No	4,465	18,295 (11,292–25,297)	5,885	23,483 (15,212–31,754)	4,151	15,828 (9,343–22,312)
Question skipped for allowed reason	7,329	30,032 (21,702–38,363)	9,068	36,183 (27,302–45,064)	7,513	28,643 (20,417–36,869)
Question left blank	223	912 (0–2,715)	240	957 (0–2,850)	351	1,337 (0–3,204)
Requires assistance from equipment when using the toilet						
Yes	2,546	10,433 (4,740–16,126)	2,749	10,970 (54,89–16,452)	3,038	11,581 (5,996–17,166)
No	9,629	39,458 (30,628–48,288)	6,303	25,149 (17,344–32,954)	10,352	39,467 (30,808–48,125)
Question skipped for allowed reason	11,794	48,327 (39,262–57,392)	14,954	59,666 (50,709–68,623)	11,664	44,470 (35,581–53,360)
Question left blank	435	1,782 (0–4,262)	1,056	4,215 (504–7,925)	1,176	4,482 (911–8,053)
Requires assistance from another person when using the toilet						
Yes	12,388	50,761 (41,692–59,830)	9,637	38,450 (29,602–47,298)	14,214	54,192 (45,293–63,092)
No	0	0	0	0	0	0
Question skipped for allowed reason	11,794	48,327 (39,262–57,392)	14,954	59,666 (50,709–68,623)	11,664	44,470 (35,581–53,360)
Question left blank	223	912 (0–2,715)	472	1,884 (0–4,505)	351	1,337 (0–3,204)
Has difficulty controlling urine						
Yes	14,667	60,102 (51,208–68,997)	14,705	58,673 (49,604–67,743)	14,550	55,472 (46,703–64,240)
No	5,311	21,762 (14,269–29,256)	4,728	18,865 (11,759–25,972)	6,723	25,631 (17,996–33,265)
Question skipped for allowed reason	4,210	17,250 (10,366–24,135)	5,629	22,461 (14,800–30,122)	4,957	18,898 (12,329–25,467)
Question left blank	216	885 (0–2,635)	0	0	0	0

^aRate per 100,000 male nursing home residents with urinary tract infection in the NHHS for that year.

SOURCE: National Nursing Home Survey, 1995, 1997, 1999.

Table 18. Special needs of male nursing home residents regardless of urinary tract infection diagnosis, count, rate* (95% CI)

Category	1995		1997		1999	
	Count	Rate	Count	Rate	Count	Rate
Has indwelling foley catheter or ostomy						
Yes	50,298	11,961 (10,569–13,352)	53,938	12,141 (10,731–13,552)	51,457	11,266 (9,941–12,591)
No	369,452	87,854 (86,453–89,254)	389,880	87,762 (86,348–89,176)	401,402	87,884 (86,497–89,271)
Question left blank	781	186 (3–368)	430	97 (0–210)	3,883	850 (385–1,315)
Requires assistance using the toilet						
Yes	207,587	49,363 (47,203–51,523)	221,599	49,882 (47,736–52,028)	241,558	52,887 (50,755–55,020)
No	141,870	33,736 (31,689–35,783)	133,378	30,023 (28,069–31,977)	128,251	28,080 (26,154–30,005)
Question skipped for allowed reason	69,267	16,471 (14,863–18,080)	86,814	19,542 (17,809–21,275)	81,977	17,948 (16,308–19,588)
Question left blank	1,807	430 (146–714)	2,459	553 (238–869)	4,956	1,085 (571–1,599)
Requires assistance from equipment when using the toilet						
Yes	57,463	13,664 (12,183–15,145)	59,329	13,355 (11,901–14,809)	67,782	14,840 (13,323–16,357)
No	143,213	34,055 (32,011–36,100)	149,218	33,589 (31,564–35,614)	162,895	35,665 (33,630–37,699)
Question skipped for allowed reason	211,137	50,207 (48,047–52,368)	220,191	49,565 (47,419–51,711)	210,228	46,028 (43,899–48,156)
Question left blank	8,719	2,073 (1,466–2,680)	15,510	3,491 (2,702–4,281)	15,837	3,467 (2,650–4,285)
Requires assistance from another person when using the toilet						
Yes	203,490	48,389 (46,230–50,548)	217,556	48,972 (46,827–51,117)	238,252	52,163 (50,029–54,297)
No	2,350	559 (237–881)	2,571	579 (234–924)	2,690	589 (237–941)
Question skipped for allowed reason	211,137	50,207 (48,047–52,368)	220,191	49,565 (47,419–51,711)	210,228	46,028 (43,899–48,156)
Question left blank	3,554	845 (451–1,239)	3,930	885 (482–1,287)	5,573	1,220 (681–1,759)
Has difficulty controlling urine						
Yes	218,491	51,956 (49,797–54,115)	232,536	52,344 (50,203–54,485)	242,189	53,025 (50,898–55,153)
No	170,988	40,660 (38,537–42,783)	175,090	39,413 (37,325–41,500)	177,128	38,781 (36,709–40,852)
Question skipped for allowed reason	29,338	6,976 (5,881–8,072)	36,416	8,197 (7,028–9,366)	34,206	7,489 (6,406–8,572)
Question left blank	1,715	408 (110–705)	207	47 (0–138)	3,220	705 (255–1,155)

*Rate per 100,000 adult male nursing home residents in the NNHS for that year.

SOURCE: National Nursing Home Survey, 1995, 1997, 1999.

Table 19. Estimated annual expenditures of privately insured employees with and without a medical claim for a UTI in 1999^a

	Annual Expenditures (per person)			
	Persons without UTI (N=267,520)		Persons with UTI (N=11,430)	
	Total	Total	Medical	Rx Drugs
Total	\$3,099	\$5,470	\$4,414	\$1,056
Age				
18–34	\$2,685	\$5,067	\$4,333	\$734
35–44	\$2,861	\$5,327	\$4,398	\$929
45–54	\$3,173	\$5,752	\$4,565	\$1,187
55–64	\$3,279	\$5,515	\$4,342	\$1,173
Gender				
Male	\$2,715	\$5,544	\$4,528	\$1,016
Female	\$3,833	\$5,407	\$4,325	\$1,082
Region				
Midwest	\$2,988	\$5,423	\$4,367	\$1,057
Northeast	\$2,981	\$5,197	\$4,157	\$1,040
South	\$3,310	\$5,838	\$4,757	\$1,080
West	\$3,137	\$5,762	\$4,716	\$1,046

Rx, prescription.

^aThe sample consists of primary beneficiaries ages 18 to 64 having employer-provided insurance who were continuously enrolled in 1999. Estimated annual expenditures were derived from multivariate models that control for age, gender, work status (active/retired), median household income (based on zip code), urban/rural residence, medical and drug plan characteristics (managed care, deductible, co-insurance/co-payments), and 26 disease conditions.

SOURCE: Ingenix, 1999.

healthcare expenditures for privately insured men diagnosed with a UTI was \$5,544 in 1999, while the expenditure was \$2,715 for men who did not experience a UTI (Table 19). In adults without a UTI, annual healthcare expenditures were lower for men than for women (\$2,715 versus \$3,833, respectively). However, there was little difference in total annual healthcare expenditures for men and women with UTI (\$5,544 vs \$5,407).

The total annual estimated expenditures for outpatient prescription medication for the treatment of UTI in both men and women between 1996 and 1998 were estimated to exceed \$96.4 million (Table 20). Fluoroquinolones accounted for a large portion of these expenditures, in terms of both costs and numbers of claims. This may reflect a growing trend toward the use of fluoroquinolones rather than other types of antimicrobials for the treatment of UTI. The extent to which fluoroquinolones were prescribed as first-line therapy for prostatitis and other appropriate indications could not be determined from this dataset.

Indirect Costs

Overall time lost from work due to UTI was similar in men and women. Although men had only slightly higher rates of work loss due to cystitis (18% of men vs 16% of women), men tended to miss more than twice as much work time (10.5 hours vs 4.8 hours) (Table 21). Men with pyelonephritis also missed more total time from work than did women (11.0 hours vs 7.7 hours), although the percentage of men missing work was slightly lower than the percentage of women (21% vs 24%). Of men diagnosed with orchitis in this sample, 14% reported missing work, for a mean total of 7.6 hours (95% CI, 2.3–12.9). For each ambulatory care visit or hospitalization for orchitis, men missed an average of 3.8 hours of work (95% CI, 1.2–6.5) (Table 22).

Based on composite data, the overall medical expenditures for men with UTI in the United States were estimated to be approximately \$1.028 billion in 2000 (Table 23). This is approximately 2.4 times lower than the overall amount spent to care for women with UTI during the same time period (see UTI in Women,

Table 20. Average annual spending and use of outpatient prescription drugs for treatment of urinary tract infection (male and female), 1996–1998^a

Drug Name	Number of Rx Claims	Mean Price	Total Expenditures
Cipro™	774,067	\$60.27	\$46,652,998
Macrobid™	477,050	\$26.80	\$12,784,949
Triple antibiotic	329,253	\$8.44	\$2,778,898
Floxin™	279,564	\$54.10	\$15,124,394
Phenazopyridine	245,275	\$5.50	\$1,349,013
Amoxicillin	183,244	\$8.46	\$1,550,247
TMP/SMX	162,216	\$6.23	\$1,010,606
Bactrim	145,898	\$13.62	\$1,987,126
Nitrofurantoin	137,353	\$38.22	\$5,249,632
TMP-SMX ds	129,853	\$5.48	\$711,594
Oxybutynin	123,631	\$28.87	\$3,569,227
Cephalexin	118,985	\$19.06	\$2,267,854
Sulfacetamide	103,917	\$6.17	\$641,168
Sulfisoxazole	96,253	\$7.82	\$752,701
Total	3,306,559		\$96,430,407

Rx, prescription.

^aEstimates include prescription drug claims with a corresponding diagnosis for urinary tract infection (both males and females) and exclude drug claims for which there was insufficient data to produce reliable estimates. Including expenditures on these excluded medications would increase total outpatient drug spending for urinary tract infections by approximately 52%, to \$146 million.

SOURCE: Medical Expenditure Panel Survey, 1996–1998.

Table 7). The costs of care for UTI in men appear to be increasing, as is the case with women (Table 23 and UTI in Women, Table 7). Inpatient care accounts for the largest portion of these expenditures, followed by physician office care and ER care. The total annual expenditures for male Medicare beneficiaries with UTI were approximately \$480.2 million in 1998 (Table 24). This is significantly higher than the expenditures for younger male Medicare beneficiaries (total \$91.1 million) but comparable on a per-person basis. Inpatient expenditures of older Medicare beneficiaries have remained constant over time after accounting for inflation (Table 25). However, spending on ambulatory services and emergency care has increased significantly in real terms between 1992 and 1998.

SPECIAL CONSIDERATIONS

Diabetes has been identified as a comorbid condition that may increase the risk of UTI. Some patients with diabetes develop voiding dysfunction, which predisposes them to an increased risk of UTI. Diabetes may also be associated with a component of immunosuppression. HCUP data from 1994 to 2000 indicate that the rates of diabetes as a comorbid condition in men hospitalized for UTI increased through the 1990s (Table 26). It is notable that diabetes is approximately twice as common among men hospitalized for UTI as it is in the general population (2).

Table 21. Average annual work loss of persons treated for urinary tract infection (95% CI)

Condition	Number of Persons ^a	% Missing Work	Average Work Absence (hr)		
			Inpatient	Outpatient	Total
Cystitis					
Males	116	18%	0.1 (0–0.4)	10.3 (0–24.5)	10.5 (0–24.7)
Females	426	16%	0	4.8 (3.0–6.6)	4.8 (3.0–6.6)
Pyelonephritis					
Males	71	21%	1.6 (0–4.7)	9.4 (2.6–16.2)	11.0 (3.6–18.4)
Females	79	24%	2.1 (0–4.2)	5.6 (2.0–9.1)	7.7 (3.7–11.7)
Other UTIs					
Males	779	15%	0.9 (0–2.6)	5.5 (3.7–7.3)	6.5 (4.0–8.9)
Females	1,846	17%	0	7.4 (5.5–9.3)	7.5 (5.6–9.3)
Orchitis	398	14%	1.5 (0.7–3.7)	6.1 (1.3–10.9)	7.6 (2.3–12.9)

^aIndividuals with an inpatient or outpatient claim for a UTI and for whom absence data were collected. Work loss is based on reported absences contiguous to the admission and discharge dates of each hospitalization or the date of the outpatient visit.

SOURCE: MarketScan, 1999.

Table 22. Average work loss associated with a hospitalization or an ambulatory care visit for treatment of urinary tract infection (95% CI)

Condition	Inpatient Care		Outpatient Care	
	Number of Hospitalizations ^a	Average Work Absence (hr)	Number of Outpatient Visits	Average Work Absence (hr)
Cystitis				
Males	*	*	157	7.6 (0–18)
Females	*	*	629	3.2 (2.2–4.3)
Pyelonephritis				
Males	*	*	87	7.7 (2.1–13)
Females	*	*	105	4.2 (2.0–6.4)
Other UTIs				
Males	*	*	1,047	4.1 (2.8–5.4)
Females	*	*	2,669	5.1 (3.9–6.4)
Orchitis	*	*	633	3.8 (1.2–6.5)

*Figure does not meet standard for reliability or precision.

^aUnit of observation is an episode of treatment. Work loss is based on reported absences contiguous to the admission and discharge dates of each hospitalization or the date of the outpatient visit.

SOURCE: MarketScan, 1999.

Table 23. Expenditures for male urinary tract infection and share of costs, by site of service (% of total)

Service Type	Year			
	1994	1996	1998	2000
Total ^a	\$811,500,000	\$903,800,000	\$969,300,000	\$1,027,900,000
Inpatient	\$626,500,000 (77.2%)	\$629,900,000 (69.7%)	\$691,100,000 (71.3%)	\$733,900,000 (71.4%)
Physician Office	\$81,200,000 (10.0%)	\$179,900,000 (19.9%)	\$157,000,000 (16.2%)	\$135,700,000 (13.2%)
Hospital Outpatient	\$18,700,000 (2.3%)	\$18,100,000 (2.0%)	\$31,000,000 (3.2%)	\$28,800,000 (2.8%)
Emergency Room	\$85,200,000 (10.5%)	\$75,900,000 (8.4%)	\$90,100,000 (9.3%)	\$129,500,000 (12.6%)

^aTotal unadjusted expenditures exclude spending on outpatient prescription drugs for the treatment of UTI. Average drug spending for UTI-related conditions (both male and female) is estimated at \$96 million to \$146 million annually for the period 1996 to 1998.

SOURCES: National Ambulatory Medical Care Survey, National Hospital Ambulatory Medical Care Survey, Healthcare Cost and Utilization Project, Medical Expenditure Panel Survey, 1994, 1996, 1998, 2000.

CONCLUSIONS

Urinary tract infections are among the most common urological disorders in both men and women. A variety of forms of UTI are recognized, and they may differ significantly, by location and severity. Overall, approximately 20% of all UTIs occur in men. These infections result in significant financial and personal costs for both individual patients and the healthcare system.

The data analyses presented here reveal several specific trends in men diagnosed with UTI. The overall rates of UTI in men appear to have remained

stable during the 1990s. Although inpatient care still accounts for a significant portion of medical care for male UTI, there has been a general trend toward greater utilization of outpatient care in various settings for treatment of UTI-related disorders. Per capita financial expenditures for UTI in men appear similar to those for UTI in women. However, the mean time lost from work by men is somewhat greater.

Table 24. Expenditures for male Medicare beneficiaries for the treatment of urinary tract infection, by site of service, 1998

Site of Service	Total Annual Expenditures	
	Age < 65	Age 65+
Inpatient	\$70,900,000	\$376,400,000
Outpatient		
Physician Office	\$9,800,000	\$59,000,000
Hospital Outpatient	\$1,300,000	\$4,700,000
Ambulatory Surgery	\$2,800,000	\$17,700,000
Emergency Room	\$6,400,000	\$22,400,000
Total	\$91,100,000	\$480,200,000

SOURCE: Centers for Medicare and Medicaid Services, 1998.

Table 25. Expenditures for male Medicare beneficiaries age 65 and over for treatment of urinary tract infection

Site of Service	Year		
	1992	1995	1998
Total	\$436,900,000	\$452,800,000	\$480,200,000
Inpatient	\$363,600,000 (83.2%)	\$364,200,000 (80.4%)	\$376,400,000 (78.4%)
Outpatient			
Physician office	\$41,400,000 (9.5%)	\$46,900,000 (10.4%)	\$59,000,000 (12.3%)
Hospital outpatient	\$2,800,000 (0.6%)	\$3,800,000 (0.8%)	\$4,700,000 (1.0%)
Ambulatory surgery	\$12,300,000 (2.8%)	\$17,400,000 (3.8%)	\$17,700,000 (3.7%)
Emergency room	\$16,800,000 (3.8%)	\$20,600,000 (4.5%)	\$22,400,000 (4.7%)

NOTE: Percentages may not add to 100% because of rounding.

SOURCE: Centers for Medicare and Medicaid Services, 1992, 1995, 1998.

Table 26. Diabetes diagnosis as a comorbidity in adult males hospitalized for urinary tract infection, count (% of total), rate^a

	1994		1996		1998		2000	
	Count	Rate	Count	Rate	Count	Rate	Count	Rate
Total	115,258	131	111,680	121	118,193	125	121,367	126
Without diabetes as listed diagnosis	92,853 (81%)	105	87,403 (78%)	95	90,294 (76%)	96	91,046 (75%)	95
With diabetes as listed diagnosis	22,405 (19%)	25	24,277 (22%)	26	27,899 (24%)	30	30,321 (25%)	32

^aRate per 100,000 based on 1994, 1996, 1998, 2000 population estimates from Current Population Survey (CPS), CPS Utilities, Unicon Research Corporation, for relevant demographic categories of US male adult civilian non-institutionalized population.

NOTE: Counts may not sum to totals due to rounding.

SOURCE: Healthcare Cost and Utilization Project Nationwide Inpatient Sample, 1994, 1996, 1998, 2000.

RECOMMENDATIONS

Analysis of these data raises several important research questions related to UTI in adult men. What is the relationship between comorbid urologic conditions such as benign prostatic hyperplasia, urinary incontinence, and urinary tract infection? What is the role of preventive care in men at risk for the development of UTI? How can the diagnosis and treatment of men with UTI be improved to minimize time lost from work and decrease overall medical expenditures? What roles do demographic factors, including race/ethnicity and geography, play in the risk for developing UTI? How can healthcare delivery be optimized to provide high-quality care while simultaneously decreasing costs and complications?

Many of these questions apply to both men and women with UTI. Additional research on health services, outcomes, economic impacts, and epidemiological factors is needed to answer these challenging questions.

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