Urologic Diseases in America Project

Bladder and Upper Tract Urothelial Cancer

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Purpose: While there are data available indicating the incidence and prevalence of bladder and upper tract urothelial cancer, population level data on resource use, costs and patterns of care for these cancers are limited. We quantified the economic impact of caring for patients with bladder and upper tract urothelial cancer, and determined the primary drivers for such costs in the population in the United States.

Materials and Methods: The analytical methods used to generate these results have been described previously.

Results: An increasing proportion of patients with bladder and upper tract urothelial cancer were being treated in the outpatient setting. Most care was provided by urologists and visit frequency was directly related to disease stage. Only a small proportion of patients potentially eligible for chemotherapy, ie those with advanced disease, sought specialized care from oncologists. Office based diagnostic tests such as cytology were not commonly done, although a substantial number of patients with bladder cancer underwent cystoscopy. The use of excretory urography in these patients was decreasing, while the use of computerized tomography was increasing. Ileal conduits were the most frequently performed type of urinary diversion following cystectomy. The cystectomy rate remained unchanged for a decade. Intravesical therapy was done infrequently in patients with bladder cancer. Annual costs for treating bladder and upper urinary tract cancers were $1 billion and $64 million, respectively, in 2000. These costs represented a $164 million increase over 1994 levels, which outpaced inflation.

Conclusions: The costs of treating bladder cancer increased steadily during a 6-year period despite a decrease in inpatient care. Coupled with a lack of substantial change in transurethral resection and cystectomy rates, this suggests that the primary cost drivers are increased outpatient testing, eg computerized tomography and cystoscopy, and an increase in the number of diagnosed cases. Greater focus on selective use of testing modalities, preventive care such as smoking cessation and earlier identification of patients at risk may help curtail further expenditure with regard to managing bladder and upper urinary tract cancers.

Key Words: bladder, bladder neoplasms, urinary tract, urothelium, health care costs

Bladder cancer is the fourth most common cancer in men and the eighth most common cancer in women in the United States.[1] It is estimated that in 2006, 64,420 new cases of bladder cancer were diagnosed and 13,060 individuals died of the disease.[1] The number of newly diagnosed cases of bladder cancer in the 2 sexes steadily increased in the last decade (table 1). Based on SEER data there were 490,458 prevalent cases of bladder cancer in 2001.[2] The lifetime risk of bladder cancer is 3.5% for males and 1.13% for females. Data regarding renal pelvis and ureteral cancer are somewhat unclear because cancers of the kidney and renal pelvis tend to be grouped together.

Overall survival of patients with bladder cancer steadily improved in the last 4 decades with an overall 5-year survival rate of 82% for all stages combined. However, due to the chronicity of superficial disease, bladder cancer is considered to be one of the most expensive cancers from diagnosis to death.[3] While general cost of care and incidence data are available for bladder cancer, more specific information regarding resource use, trends in care and factors affecting variations in care are not well delineated. We examined patterns of care, resource use and the economic burden in regard to bladder and upper tract urothelial cancer in the population in the United States.

MATERIALS AND METHODS

The analytical methods used to generate these results have been described previously.[4]

TRENDS IN HEALTH CARE RESOURCE USE

Bladder Cancer

Inpatient care. The frequency of inpatient care for bladder cancer decreased in the Medicare and nonMedicare populations. The decrease was observed in the 2 genders, and in whites and black Americans. The rate of inpatient stay was highest in the Northeast and in patients who were 80 to 89 years old. According to Healthcare Cost and Utilization Project data the rate of inpatient stay was also higher in urban areas.

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TABLE 1. *Estimated new bladder cancer cases in United States*

	Count (% all new Ca)
1996:	
Total	52,900 (3.9)
Men	38,300 (5)
Women	14,600 (2.5)
1998:	
Total	54,400 (4.4)
Men	39,500 (6.3)
Women	14,900 (2.5)
2000:	
Total	53,200 (4.4)
Men	38,300 (6.2)
Women	14,900 (2.5)
2002:	
Total	56,500 (4.4)
Men	41,500 (6.5)
Women	15,000 (2.3)
2004:	
Total	60,240 (4.4)
Men	44,640 (6.4)
Women	15,600 (2.3)

Source: Cancer Statistics, 1996, 1998, 2000 and 2004. American Cancer Society Surveillance Research.

Outpatient care. For ambulatory surgery Medicare and nonMedicare data indicated an increasing frequency of ambulatory surgical and outpatient care for patients with bladder cancer, while the frequency of inpatient care correspondingly decreased. The overall rate of ambulatory surgery visits by Medicare patients increased for the entire population and for individuals of all races with sufficient counts from which to draw conclusions. A decrease was observed in individuals younger than 65 years. Hospital outpatient visits by Medicare patients increased from 1992 to 1995 and then began to decrease. This pattern was observed in males and in all racial groups except black Americans.

Physician office visit rates for nonMedicare patients appeared to vary by region and were higher in males and in older patients. Nationwide patients of all ages with bladder cancer made 764,267 visits to physician offices in 2000 and Medicare beneficiaries made 368,200 office visits in 2001. Of these visits 68% were to urologists (table 2). SEER data suggest that the largest proportion of office visits within 12 months following diagnosis were made by patients with stage I disease, although the actual rate of visits increased concomitantly with disease stage. There were no gender or race based differences in the rate of office visits but patients who were 65 to 75 years old had significantly higher rates of visits than older individuals. Of patients with a specific bladder cancer related office visit within 12 months of diagnosis 92% went to urologists, 8% went to medical oncologists and 18% went to internists (table 3). The proportion of patients visiting a medical oncologist increased appropriately with increasing disease stage, although only 36% of those with stage IV disease did so (table 3). Even when it was assumed that visits to internists and physicians of unlisted specialty were visits to medical oncologists, a substantial fraction of patients with stage III and IV disease would not have visited a physician who could treat them with potentially beneficial systemic chemotherapy. The pattern of distribution of office visits among urologists, medical oncologists, internists and other specialists remained fairly similar across age, gender and racial groups (table 3).

According to NAMCS data for physician office based, diagnostic testing and procedures 54% of patients with a diagnosis of lower tract TCC underwent urinalysis during office visits, while 21% underwent cystoscopy. Data on urine cytology were not available in NAMCS but cytology testing was infrequently done in Medicare beneficiaries with bladder cancer. Although the rate of use of such testing increased steadily in the last decade, only 3.3% of patients underwent cytology in 2001 (table 4). The rate did not vary significantly among age groups, genders or racial groups. There was some variation by geographic region with the highest rates observed in the West and the lowest rates observed in the Northeast in 2001. Until 2001 the highest rates of urine cytology were observed in the Midwest, where rates were almost twice those of the next highest region, the South. Regional variations were not consistent during the years. The low frequency of cytology testing may reflect a lack of accurate documentation, the use of bladder washing as opposed to routine voided cytology or billing to nonMedicare insurers. Regional variations may have been due to differences in the availability of cytopathologists and other resources or differential use of testing resources (cytology) by physicians in general as opposed to those used only by urologists (cystoscopy). In 2001 cytology rates were also lowest in black Americans.

Cystoscopy was by far the most common office procedure in patients with bladder cancer. The use of cystoscopy concomitantly with an office visit increased with time (table 5). The rates of cystoscopy were lower in black than in white Americans, although this gap gradually narrowed during the period analyzed. These data are consistent with those reported by Schrag et al using SEER-Medicare data.[5] Schrag et al observed that only 40% of all patients with nonmuscle invasive bladder cancer underwent surveillance at a frequency that they considered standard, ie cystoscopy at each 6-month interval in the first 3 years following initial diagnosis. They also observed that reaching age 75 years, living in a low income area, low grade tumor and higher comorbidity were associated with less intense surveillance. Retrograde pyelography was infrequently performed in the office setting with rates of 436/100,000 to 663/100,000 Medicare patients with a bladder cancer diagnosis noted in a 10-year period. In the most recent 3 years for which data were available there was actually a steady decrease in office performed retrograde pyelograms. This may reflect the increased use of ambulatory surgery centers or hospitals for performing this procedure or the supplantation of retrograde pyelography by CT urography. The observed regional variations in the frequency of office based ancillary diagnos-

TABLE 2. *Physician office visits for lower tract TCC as any diagnosis*

Physician Specialty	1992–2000		
	Count	Annualized Rate/ 100,000 Population	% (95% CI)
Totals	3,470,336	661	100
Urology	2,385,136	454	68.7 (58.6–78.9)
All others	1,085,200	207	31.3 (18.7–43.8)

Rate per 100,000 based on 1992, 1994, 1996, 1998 and 2000 population estimates from CPS, CPS Utilities, Unicon Research Corp. for relevant demographic categories of noninstitutionalized civilians 40 years or older and rate per 100,000 adults older than 40 years based on estimated number of visits for lower tract TCC in NAMCS, 1992 to 2000 (counts may not sum to total due to rounding) (source: NAMCS, 1992, 1994, 1996, 1998 and 2000).

TABLE 3. *Outpatient visits for lower tract TCC in year following diagnosis by physician specialty*

	No. Pts With Lower Tract TCC	% Office Visit (95% CI)					
		Urology	Oncology	Internal Medicine	Radiation Oncology	Other Specialty	Unknown Specialty
Totals	23,588	92 (92–92)	8 (8–9)	18 (18–19)	1 (1–1)	4 (4–5)	10 (9–10)
Sex:							
M	16,921	93 (92–93)	8 (8–8)	17 (16–18)	1 (1–1)	4 (4–5)	10 (9–10)
F	6,667	91 (90–91)	10 (9–10)	21 (20–22)	1 (1–2)	5 (5–6)	9 (9–10)
Age:							
65–75	11,876	93 (92–93)	9 (8–9)	18 (17–18)	1 (1–1)	5 (4–5)	10 (9–10)
76–85	9,263	92 (91–93)	9 (8–9)	18 (17–19)	1 (1–2)	5 (4–5)	10 (9–10)
86–95	2,358	90 (89–91)	6 (5–7)	19 (18–21)	2 (1–2)	4 (3–5)	9 (8–11)
96 or Older	91	88 (81–95)	*	16 (9–24)	*	*	*
Race/ethnicity:							
White	21,699	92 (92–93)	8 (8–9)	18 (17–18)	1 (1–1)	4 (4–5)	9 (9–10)
Black	883	87 (85–89)	11 (9–13)	22 (20–25)	1 (1–2)	5 (4–7)	17 (14–19)
Hispanic	164	93 (89–97)	*	17 (11–23)	*	*	13 (8–18)
Asian	409	92 (89–94)	8 (5–10)	24 (20–28)	*	5 (3–8)	11 (8–14)
North American native	20	*	*	*	*	*	*
Other	315	88 (84–91)	10 (7–13)	24 (19–29)	3 (1–6)	7 (4–10)	8 (5–11)
Unknown	98	85 (78–92)	*	22 (14–31)	0	*	*
Stage:							
I	17,164	94 (94–95)	3 (3–3)	14 (13–15)	0 (0–0)	3 (2–3)	7 (7–8)
II	2,296	88 (87–90)	20 (18–22)	28 (27–30)	3 (3–4)	10 (8–11)	15 (13–16)
III	1,366	88 (86–89)	25 (23–28)	30 (28–32)	4 (3–5)	10 (8–11)	18 (16–20)
IV	1,749	79 (77–81)	36 (34–38)	34 (32–37)	4 (3–5)	11 (10–13)	21 (19–22)
Unknown	1,013	88 (86–90)	8 (6–10)	18 (16–21)	1 (1–2)	4 (3–5)	10 (8–12)

Patients with bladder Cancer 65 years or older diagnosed in 1991 though 1999, with at least 1 lower tract TCC related outpatient visit, excluding 10,254 with no lower tract TCC related office visits in the 12 months following diagnosis (source: SEER, 1991 to 2000).
* Value does not meet reliability or precision standard.

tic tests may also have been affected by reimbursement rates, insurance payer mix and patient demographics.

For physician office tests for staging evaluation the number of patients undergoing CT before radical cystectomy increased among Medicare beneficiaries during the 4 index years of observation, which span the decade from 1992 to 2001. Most of this increase was observed in white patients and almost no change was seen in black patients. Although CT was commonly used before surgery in those with muscle invasive disease, the rates that we report were calculated per 100,000 patients with a diagnosis of bladder cancer and not just in those with invasive disease who would require additional imaging to assess disease stage. Racial variations in stage at presentation may explain variations in staging modalities. The increase in CT during the observation period, which was accompanied by a corresponding decrease in excretory urography after a peak in 1995, suggests that excretory urography may have been largely replaced by CT urography for upper tract evaluation in these patients. Medicare data indicated that MRI was performed infrequently for staging patients with bladder cancer. While the rate of MRI in patients with bladder cancer was 157/100,000 in 2001, the rate for CT was 8,955/100,000. The MRI use rate gradually decreased after a sharp increase in 1995. The frequency of use of bone scanning in patients with bladder cancer increased from 2.9% (2,922/100,000) in 1992 to 3.9% (3,928/100,000) in 2001. The absolute count of bone scans only in patients before cystectomy also showed a gradual increase across all age groups except in those 70 to 74 years old, and in all regions and all racial groups.

Treatment. The average annualized rate of transurethral surgery in Medicare patients with a diagnosis of bladder cancer was 51% (table 6). This rate was consistent across genders, geographic regions and races. It varied between 46% in the youngest age group (65 to 69 years) and 60% in those 90 to 94 years old. The rate was fairly constant during the 4 years studied. Data from the SEER program indicated that a majority of patients underwent transurethral resection following the initial diagnosis of bladder cancer. This could have been repeat primary resection or resection of recurrent tumors. About 20% of patients did not undergo any further surgery, while 8% went on to cystectomy. Rates of no further surgery were higher in men, in individuals younger than 65 years, in nonwhite patients, and in those with stages I and IV disease.

An annual average of 18,607/100,000 Medicare patients with a bladder cancer diagnosis underwent intravesical therapy. Annualized rates were higher in white and Asian patients, and lowest in black and Hispanic patients. Rates of intravesical therapy did not vary greatly by age or region but they were lower in the Midwest and Northeast. During the 4 years studied the rate of intravesical therapy was 17,434/100,000 to 20,915/100,000 Medicare patients with bladder cancer with the highest rate observed in the most recent year analyzed (2001).

SEER data indicated that the rate of cystectomy in patients with newly diagnosed bladder cancer did not change significantly during the 10-year period 1990 to 1999 at 67/1,000 to 91/1,000 yearly. The cystectomy rate was age sensitive with the lowest rates consistently observed in those older than 80 years. Although the rate of cystectomy in some years was lower in black patients, the difference was not significant and the trend was not consistent. The highest rates were observed in patients with stages III and IV disease but this may have been due to the SEER use of pathological rather than clinical staging. Many individuals with high stage disease could have undergone radical cystectomy if they had been at a lower clinical stage and had muscle invasive disease (stage II). This is often the case in bladder cancer since clinical staging is notorious for underestimat-

TABLE 4. *Urine cytology in physician office setting for Medicare beneficiaries with bladder cancer*

	1992			1995			1998			2001		
	Count	Rate (95% CI)	Age Adjusted Rate	Count	Rate (95% CI)	Age Adjusted Rate	Count	Rate (95% CI)	Age Adjusted Rate	Count	Rate (95% CI)	Age Adjusted Rate
Totals	3,540	1,396 (1,110–1,682)		5,640	2,198 (1,858–2,537)		7,920	3,117 (2,696–3,537)		8,920	3,293 (2,896–3,690)	
Age												
65–69	740	1,508 (897–2,119)		1,440	3,216 (2,250–4,182)		1,740	4,378 (3,103–5,654)		1,740	4,296 (3,037–5,556)	
70–74	940	1,448 (913–1,982)		1,300	1,984 (1,340–2,628)		2,000	3,206 (2,251–4,161)		2,060	3,318 (2,516–4,121)	
75–79	980	1,578 (852–2,303)		1,220	1,976 (1,355–2,598)		1,960	3,112 (2,322–3,902)		2,540	0	
80–84	580	1,302 (664–1,941)		940	1,952 (1,214–2,689)		1,420	2,878 (2,011–3,745)		1,580	2,897 (2,020–3,774)	
85–89	200	865 (232–1,498)		680	2,589 (1,313–3,866)		660	2,354 (1,324–3,384)		720	2,351 (1,334–3,369)	
90–94	100	1,266 (0–2,574)		60	741 (0–1,822)		120	1,263 (0–2,564)		260	2,554 (802–4,306)	
95 or Older	0	0.0		0	0.0		20	1,266 (0–3,747)		20	1,282 (0–3,795)	
Sex:												
M	2,780	1,542 (1,191–1,894)	1,565	4,100	2,241 (1,834–2,648)	2,252	5,860	3,252 (2,743–3,761)	3,307	6,520	3,346 (2,871–3,821)	3,295
F	760	1,035 (553–1,518)	954	1,540	2,091 (1,476–2,706)	2,064	2,060	2,788 (2,045–3,531)	2,625	2,400	3,157 (2,435–3,879)	3,289
Race/ethnicity:												
White	3,380	1,454 (1,146–1,762)	1,454	5,520	2,297 (1,937–2,658)	2,289	7,800	3,293 (2,844–3,742)	3,301	8,540	3,383 (2,965–3,801)	3,375
Black	40	402 (0–958)	201	80	846 (20–1,672)	1,057	40	398 (0–948)	199	200	2,000 (652–3,348)	1,800
Asian	Not available	Not available	Not available	0	0.0	0.0	0	0.0	0.0	60	3,846 (0–9,436)	2,564
Hispanic	Not available	Not available	Not available	0	0.0	0.0	20	909 (0–2,691)	0.0	80	3,333 (0–8,485)	3,333
North American native	Not available	Not available	Not available	0	0.0	0.0	0	0.0	0.0	20	7,692 (0–22,769)	7,692
Region:												
Midwest	1,900	3,857 (2,797–4,917)	3,898	3,140	5,747 (4,516–6,977)	5,820	3,280	5,793 (4,565–7,021)	5,934	2,120	3,563 (2,719–4,407)	3,496
Northeast	240	473 (184–762)	473	380	707 (329–1,086)	782	1,000	1,940 (1,199–2,682)	2,018	1,200	2,181 (1,418–2,944)	2,290
South	1,120	1,707 (1,044–2,370)	1,646	1,340	1,906 (1,366–2,446)	1,935	2,820	3,759 (2,894–4,624)	3,626	3,600	4,414 (3,562–5,266)	4,414
West	280	959 (276–1,642)	1,027	780	2,566 (1,456–3,675)	2,237	660	2,170 (1,351–2,988)	2,104	1,920	5,811 (4,375–7,247)	5,751

Based on CPT codes 88104 (cytopathology, nonOB fluids, washing/brushings, except cervical/vaginal smears with interpretation), 88106 (cytopathology nonOB fluids, washing/brushings, filter only with interpretation), 88107 (cytopathology, nonOB fluids, washing/brushings, smear and filter with interpretation), 88108 (cytopathology, concentration technique, smears and interpretation), 88112 (cytopathology, selective callular enhancement technique with interpretation, eg liquid based slide methods except cervical or vaginal) with unweighted counts multiplied by 20 to arrive at values, rate per 100,000 Medicare beneficiaries 65 years or older with bladder cancer diagnosis on the same claim as the procedure, age adjusted rate adjusted to 2001, and individuals of other races, unknown race and ethnicity, and other region included in the total (counts less than 600 should be interpreted with caution) (source: Centers for Medicare and Medicaid Services, 1992, 1995, 1998 and 2001).

TABLE 5. *Cystoscopy in physician office setting for Medicare beneficiaries with bladder cancer*

	1992			1995			1998			2001		
	Count	Rate (95% CI)	Age Adjusted Rate	Count	Rate (95% CI)	Age Adjusted Rate	Count	Rate (95% CI)	Age Adjusted Rate	Count	Rate (95% CI)	Age Adjusted Rate
Totals	125,940	48,401 (46,907–49,895)		145,820	55,105 (53,557–56,654)		151,460	57,541 (55,987–59,095)		177,100	62,815 (61,266–64,364)	
Age:												
65–69	26,840	52,814 (49,269–56,359)		27,820	59,623 (55,832–63,414)		25,160	60,539 (56,531–64,547)		27,720	65,132 (61,056–69,207)	
70–74	31,800	47,605 (44,712–50,497)		37,820	55,683 (52,605–58,762)		37,500	57,853 (54,696–61,009)		41,800	64,586 (61,355–67,817)	
75–79	31,800	49,922 (46,882–52,961)		35,940	56,634 (53,437–59,831)		39,600	60,662 (57,435–63,889)		47,920	64,897 (61,836–67,958)	
80–84	22,560	49,670 (45,971–53,368)		28,420			30,700	60,172 (56,600–63,745)		35,340	62,527 (59,029–66,024)	
85–89	9,700	41,382 (36,911–45,854)		11,800	44,162 (39,731–48,592)		13,820	48,086 (43,915–52,258)		18,140	57,369 (53,011–61,726)	
90–94	2,860	35,572 (27,882–43,262)		3,400	41,063 (32,878–49,248)		3,940	40,871 (34,030–47,713)		5,200	49,904 (42,111–57,697)	
95–97	300	19,481 (7,442–31,519)		380	25,676 (13,713–37,638)		540	33,750 (18,179–49,321)		700	44,304 (28,612–59,995)	
98 or Older	80	18,182 (0–39,121)		240	40,000 (17,762–62,238)		200	35,714 (10,584–60,845)		280	41,176 (17,599–64,754)	
Sex:												
M	86,080	46,610 (44,877–48,344)	47,293	101,700	53,867 (52,057–55,676)	54,492	105,840	56,629 (54,789–58,470)	57,432	126,100	62,167 (60,345–63,990)	62,956
F	39,860	52,781 (49,866–55,696)	51,086	44,120	58,190 (55,206–61,174)	56,634	45,620	59,775 (56,877–62,672)	57,809	51,000	64,475 (61,537–67,413)	62,427
Race/ethnicity:												
White	119,040	49,862 (48,286–51,438)	49,820	139,840	56,392 (54,778–58,005)	56,424	145,040	59,041 (57,422–60,660)	59,057	168,440	64,016 (62,405–65,628)	
Black	2,080	20,635 (15,262–26,008)	19,643	2,800	29,167 (22,898–35,435)	29,375	3,020	29,666 (23,521–35,812)	29,273	4,120	40,392 (33,353–47,431)	
Asian	Not available	Not available	Not available	320	51,613 (20,296–82,929)	51,613	520	37,143 (20,616–53,670)	31,429	680	43,590 (25,147–62,033)	
Hispanic	Not available	Not available	Not available	400	37,736 (19,274–56,198)	37,736	820	36,937 (21,901–51,973)	36,937	1,000	40,323 (26,502–54,144)	
North American native	Not available	Not available	Not available	0	0.0	0.0	20	33,333 (0–98,667)	33,333	200	83,333 (7,679–158,988)	
Region:												
Midwest	30,380	59,897 (56,261–63,534)	60,055	36,080	64,108 (60,608–67,608)	63,753	37,680	63,973 (60,639–67,307)	63,803	42,620	68,411 (65,058–71,764)	68,796
Northeast	34,300	65,358 (61,732–68,985)	65,739	37,760	67,573 (63,987–71,159)	66,786	36,820	68,515 (64,913–72,117)	68,478	42,100	72,486 (68,979–75,993)	71,109
South	40,060	59,190 (56,011–62,369)	59,338	47,540	64,999 (61,889–68,109)	65,819	52,380	67,016 (63,985–70,048)	68,270	63,400	74,466 (71,522–77,410)	75,100
West	20,620	67,740 (63,030–72,449)	66,294	23,900	75,347 (70,510–80,183)	75,284	23,940	75,094 (70,391–79,797)	72,083	28,160	81,340 (76,574–86,106)	81,225

Based on CPT codes 52000 (cystoscopy) and 52001 (cystoscopy, removal of clots) with unweighted counts multiplied by 20 to arrive at values, rate per 100,000 Medicare beneficiaries 65 years or older with bladder cancer diagnosis on the same claim as the procedure, age adjusted rate adjusted to 2001, and individuals of other races, unknown race and ethnicity, and other region included in the total (counts less than 600 should be interpreted with caution) (source: Centers for Medicare and Medicaid Services, 1992, 1995, 1998 and 2001).

TABLE 6. *Transurethral surgery for Medicare beneficiaries with bladder cancer in 1992 to 2001*

	Count	Annualized Rate
Total:	408,460	50,647
Sex:		
M	292,580	50,299
F	115,880	51,548
Age:		
65–69	65,800	46,286
70–74	98,060	47,126
75–79	99,720	52,639
80–84	79,020	52,849
85–89	45,380	54,024
90–94	16,000	60,060
95–97	2,740	58,051
98 or Older	1,100	57,292
Race/ethnicity:		
White	376,640	50,240
Black	18,440	55,542
Asian	1,180	54,630
Hispanic	2,200	59,783
Region:		
Midwest	109,900	67,873
Northeast	107,040	66,600
South	138,460	65,783
West	51,160	61,255

Based on CPT 52224 (cystourethroscopy with fulguration, including cryosurgery or laser surgery, or treatment of minor [less than 0.5 cm] lesion[s] with or without biopsy), CPT 52234 (cystourethroscopy, with fulguration, including cryosurgery or laser surgery, and/or resection of small bladder tumor[s] [0.5 to 2.0 cm]), CPT 52235 (cystourethroscopy, with fulguration, including cryosurgery or laser surgery, and/or resection of medium bladder tumor[s] [2.0 to 5.0 cm]), 52240 (cystourethroscopy, with fulguration, including cryosurgery or laser surgery, and/or resection of large bladder tumor[s]), ICD, 9th revision codes 57.4 (transurethral excision or destruction of bladder cancer) and 57.49 (other transurethral excision or destruction of lesion or tissue of bladder) with no requirement for bladder cancer diagnosis counted except for ICD, 9th revision code 57.87, unweighted counts multiplied by 20 to arrive at values, rate per 100,000 Medicare beneficiaries with bladder cancer, annualized yearly and individuals of other races, unknown race and ethnicity, and other region included in the total.

ing disease extent. Independent analysis of SEER data suggested that age, stage and geographic region were the most influential factors dictating whether a patient was a candidate for cystectomy.[6]

The average frequency of ileal conduit urinary diversion during the 10-year period 1992 to 2001 was 2,433/100,000 Medicare patients with bladder cancer yearly. These data suggested that the rate did not change greatly, although a slight upturn was observed in the most recent 2 years studied, when the highest rates were recorded (2,544/100,000 and 2,554/100,000 in 1998 and 2001, respectively). Rates of ileal conduit use did not differ significantly by gender. A decrease in ileal conduit use was also noted in patients 70 to 74 years old in 2001 compared with prior years and other age groups. While the overall rate of ileal conduit use per 100,000 patients with bladder cancer did not change dramatically, there was a steady increase in the actual number of ileal conduits used from 4,520 in 1992 to 5,260 in 2001. This may be an indirect indicator of an increase in the actual number of cystectomies performed consequent to an increase in the number of patients diagnosed with bladder cancer annually.

The annualized rate of neobladder or continent diversion was 370/100,000 Medicare patients with a diagnosis of bladder cancer. This was about 85% lower than the use rate of ileal conduits in this population. To ensure that all types of continent diversions and neobladders were captured in this analysis an exhaustive set of CPT and ICD codes was used to identify such procedures. While a small increase was observed in the rate of neobladder/continent diversion in 1998, the rate in 2001 returned to levels comparable to those observed in prior years. As expected, the rate was highest in the younger patients in the Medicare population. The rate of neobladder/continent diversion was consistently lowest in the Northeast and no change was evident in regional variation during the years studied. No significant differences by gender or race were observed. Multivariate analysis of SEER data suggested that several factors affected the decision to use diversion, particularly neobladder reconstruction.[7] These factors were patient age, geographic region, patient education level and year of surgery. Interestingly patient comorbidity and race/ethnicity were not predictive of neobladder diversion.

Little data exist regarding factors affecting the use of systemic chemotherapy for bladder cancer. Published data suggested that younger individuals were more likely to receive aggressive treatments, including systemic chemotherapy and cystectomy, for advanced bladder cancer than were individuals older than 75 years.[6]

Economic impact. Total expenditures for lower tract TCC in the United States were more than $1 billion in 2000, an increase of more than $160 million since 1994. Annual expenditures for physician office visits accounted for the ma-

TABLE 7. *Expenditures for Medicare beneficiaries for lower tract TCC*

	$ Expenditure (% total)			
Service Type	1992	1995	1998	2001
Age 65 or older:				
Hospital outpt	16,832,700 (3.5)	24,037,440 (4.6)	22,842,080 (4.1)	24,617,520 (3.8)
Physician office	21,156,660 (4.4)	33,381,600 (6.3)	51,158,160 (9.2)	92,023,440 (14.3)
Ambulatory surgery	75,498,480 (15.7)	116,868,960 (22.2)	125,991,360 (22.6)	114,842,400 (17.9)
Emergency room	1,459,080 (0.3)	1,599,000 (0.3)	2,247,240 (0.4)	1,139,600 (0.2)
Inpt	365,577,240 (76.1)	350,875,800 (66.6)	355,359,840 (63.7)	410,143,200 (63.8)
Totals	480,524,160	526,762,800	557,598,680	642,766,160
Younger than 65:				
Hospital outpt	464,000 (2.0)	913,920 (4.4)	1,106,700 (3.4)	816,960 (1.8)
Physician office	559,420 (2.4)	782,880 (3.7)	1,702,400 (5.3)	2,926,080 (6.6)
Ambulatory surgery	1,542,240 (6.7)	3,867,420 (18.5)	5,470,920 (16.9)	4,575,680 (10.3)
Emergency room	— (0.0)	— (0.0)	— (0.0)	— (0.0)
Inpt	20,297,140 (88.8)	15,376,240 (73.4)	24,058,440 (74.4)	35,919,240 (81.2)
Totals	22,862,800	20,940,460	32,338,460	44,237,960

Source: Centers for Medicare and Medicaid Services, 1992, 1995, 1998 and 2001.

TABLE 8. *Estimated annual expenditures of privately insured employees with and without medical claim for lower tract TCC in 2002*

	$ Expenditure/Pt/Yr Without Ca (342,771 pts)			% Expenditure/Pt/Yr With Ca (615 pts)		
	Medical	Prescription Drugs	Totals	Medical	Prescription Drugs	Totals
All	3,469	1,404	4,873	12,109	2,349	14,458
Age:						
50–54	3,637	1,482	5,119	7,743	2,258	10,001
55–59	3,718	1,462	5,180	9,570	2,218	11,788
60–64	3,569	1,397	4,966	8,268	2,191	10,459
Sex:						
M	3,428	1,334	4,762	10,633	2,151	12,784
F	3,527	1,503	5,030	14,178	2,625	16,803
Region:						
Midwest	3,461	1,341	4,802	12,093	2,261	14,354
Northeast	3,251	1,493	4,744	11,356	2,499	13,855
South	3,646	1,380	5,026	12,737	2,292	15,029
West	3,470	1,371	4,841	12,123	2,311	14,434

Primary beneficiaries 40 to 64 years old with employer provided insurance who were continuously enrolled in 2002 with estimated annual expenditures derived from multivariate models controlling 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 or co-insurance/co-payments) and binary indicators for 28 chronic disease conditions (predicted expenditures for those 40 to 49 years old omitted due to small sample size) (source: Ingenix, 2002).

jority of the increase, growing from $55 million in 1994 to $188 million in 2000, representing an increase of 239% and substantially outpacing inflation. All other services for lower tract TCC treatment increased slightly but did so at a rate far less than would have been expected based on inflation, indicating a decrease in real expenditures during the study period. Inpatient services accounted for a progressively smaller proportion of total expenditures with time but they were still important, accounting for more than half of total expenditures in 2000. Ambulatory surgery was also an important source of expenditures in 2000, accounting for more than 20% of total costs for lower tract TCC.

Lower tract TCC was also an important source of expenditures for Medicare enrollees 65 years or older. These expenditures totaled $643 million in 2001, representing an increased of more than 33% since 1992 (table 7). Similar to those of the general population, Medicare inpatient services accounted for the greatest proportion of expenditures during the study period but physician office visits were the major driving force behind the increase. Inpatient services and ambulatory surgery also contributed substantially to the observed expenditure increases with time. Hospital outpatient services and emergency room visits were an insignificant source of costs for lower tract TCC treatment in the Medicare population older than 64 years.

Expenditures for Medicare enrollees younger than 65 years were substantially lower, amounting to only $44 million in 2001. Nevertheless, increases with time were dramatic, more than doubling since 1995. Inpatient services accounted for more than 80% of these expenditures in 2001 they and were responsible for the majority of increases in expenditures with time. While expenditures for physician office visits made up only about 7% of all expenditures in this population in 2001, they more than quadrupled between 1992 and 2001.

Individual level expenditures for lower tract TCC treatment were estimated using risk adjusted regression models controlling for age, sex, work status, income, urban or rural residence and health plan characteristics (table 8). In 18 to 64-year-old patients with employer provided insurance average annual expenditures for those treated for lower tract TCC were $14,458 compared with $4,873 for similar individuals not treated for this condition, representing an incremental cost of $9,585. The higher costs associated with the diagnosis of lower tract TCC are expected because the condition is typically treated surgically and it is associated with intensive followup. About 16% of individual level expenditures were for pharmaceuticals. Incremental costs associated with lower tract TCC were greatest among individuals 55 to 59 years old, apparently reflecting differences in medical expenditures rather than pharmaceutical costs, which were similar across age groups. Medical and pharmaceutical costs associated with a diagnosis of lower tract TCC were higher in women than in men ($16,803 vs $12,784) but they did not vary substantially by region.

Overall 29% of individuals with employer provided health insurance and a claim for lower tract TCC missed work with an average of almost 4 days of work missed per individual diagnosed with TCC. The proportion was similar for men and women. An average of just less than 3 days of work was missed for outpatient visits with men appearing to miss more work for such visits than women. Although only 8 inpatient stays for lower tract TCC treatment were observed, an average of 10 days of work were missed per hospitalization. Patients with lower tract TCC in the North Central region missed more hours per outpatient visit than those in the Northeast region.

Upper Tract Urothelial Cancer

Inpatient care. Inpatient care for upper tract urothelial cancer remained stable during the decade of the 4 index years (1992 to 2001). While there were no significant differences between age groups or by race, women had a lower

TABLE 9. *1994–1996 Ambulatory surgery visits for upper tract TCC as any diagnosis*

Count	6,838
Rate (95% CI)	6.7 (2.9–10)
Av annualized rate/yr	2.2
Age adjusted rate	6.7

Rate per 100,000 based on 1994, 1995 and 1996 population estimates from CPS, CPS Utilities, Unicon Research Corp. for relevant demographic categories of adult civilian noninstitutionalized population, 40 years or older in the United States and age adjusted rate adjusted to the United States Census derived age distribution of the mid point of years (source: National Survey of Ambulatory Surgery, 1994, 1995 and 1996).

TABLE 10. *Visits to ambulatory surgery centers by Medicare beneficiaries with upper tract TCC as primary diagnosis*

	1992			1995			1998			2001		
	Count	Rate (95% CI)	Age Adjusted Rate	Count	Rate (95% CI)	Age Adjusted Rate	Count	Rate (95% CI)	Age Adjusted Rate	Count	Rate (95% CI)	Age Adjusted Rate
Totals	940	2.7 (1.9–3.5)	2.7	1,080	3.1 (2.2–3.9)	3.1	1,360	4.1 (3.1–5.0)	4.1	1,700	4.8 (3.8–5.8)	4.8
Total younger than 65	20	0.4 (0.0–1.1)		80	1.3 (0.0–2.6)		40	0.6 (0.0–1.5)		60	0.9 (0.0–1.8)	
Total 65 or older	920	3.1 (2.2–4.0)		1,000	3.4 (2.5–4.4)		1,320	4.8 (3.7–6.0)		1,640	5.8 (4.6–7.1)	
Age:												
65–69	160	1.8 (0.5–3.0)		340	4.0 (2.1–5.9)		220	3.0 (1.2–4.8)		180	2.4 (0.8–4.0)	
70–74	180	2.4 (0.8–3.9)		300	3.9 (1.9–5.8)		380	5.4 (3.0–7.9)		480	6.9 (4.1–9.7)	
75–79	200	3.5 (1.3–5.6)		180	3.2 (1.1–5.2)		340	6.0 (3.1–8.9)		560	9.4 (5.9–13)	
80–84	200	5.3 (2.0–8.5)		140	3.5 (0.9–6.2)		180	4.7 (1.6–7.8)		200	4.9 (1.9–8.0)	
85–89	160	7.8 (2.4–13)		20	0.9 (0.0–2.7)		140	6.4 (1.6–11)		220	9.4 (3.9–15)	
90 or Older	20	2.4 (0.0–7.1)		0	0.0		60	6.6 (0.0–14)		0	0.0	
Sex:												
M	580	3.9 (2.5–5.3)	4.0	700	4.6 (3.1–6.1)	4.6	820	5.7 (3.9–7.4)	5.4	1,120	7.3 (5.4–9.2)	7.3
F	360	1.8 (1.0–2.6)	1.7	380	1.9 (1.0–2.7)	1.9	540	2.8 (1.8–3.9)	3.0	580	2.9 (1.9–4.0)	2.9
Race/ethnicity:												
White	820	2.8 (1.9–3.6)	2.7	1,020	3.4 (2.4–4.3)	3.4	1,320	4.6 (3.5–5.8)	4.8	1,620	5.4 (4.2–6.6)	5.4
Black	80	2.7 (0.1–5.3)	2.0	40	1.2 (0.0–2.9)	1.2	20	0.6 (0.0–1.9)	0.0	20	0.6 (0.0–1.7)	0.6
Asian	Not available	Not available	Not available	0	0.0	0.0	0	0.0	0.0	20	4.2 (0.0–12)	4.2
Hispanic	Not available	Not available	Not available	0	0.0	0.0	20	2.8 (0.0–8.4)	0.0	0	0.0	0.0
North American native	Not available	Not available	Not available	0	0.0	0.0	0	0.0	0.0	20	30 (0.0–88)	30
Region:												
Midwest	240	2.7 (1.2–4.3)	3.2	240	2.7 (1.2–4.2)	2.7	580	6.7 (4.3–9.2)	7.4	360	4.1 (2.2–6.0)	4.1
Northeast	140	1.8 (0.5–3.2)	2.1	240	3.1 (1.4–4.9)	3.1	180	2.7 (0.9–4.4)	2.7	580	8.4 (5.3–11)	8.4
South	280	2.3 (1.1–3.5)	2.3	460	3.6 (2.1–5.1)	3.5	360	2.9 (1.6–4.2)	2.7	560	4.2 (2.7–5.8)	4.4
West	280	5.1 (2.4–7.8)	3.7	120	2.3 (0.5–4.2)	2.7	240	4.8 (2.1–7.6)	4.0	200	3.7 (1.4–6.0)	3.0

Unweighted counts multiplied by 20 to arrive at values, rate per 100,000 Medicare beneficiaries in the same demographic stratum, age adjusted rate adjusted to the United States Census derived age distribution of the year under analysis, and individuals of other races, unknown race and ethnicity, and other region included in the total (counts less than 600 should be interpreted with caution) (source: Centers for Medicare and Medicaid Services, 5% Carrier and Outpatient Files, 1992, 1995, 1998 and 2001).

TABLE 11. *Expenditures for Medicare beneficiaries for treatment for upper tract TCC (% of total)*

Service Type	$ Expenditure (% total)			
	1992	1995	1998	2001
Age 65 or older:				
Hospital outpt	636,000 (2.5)	366,600 (1.4)	643,080 (2.2)	851,520 (2.6)
Physician office	785,840 (3.1)	1,286,940 (4.8)	2,154,120 (7.3)	4,107,740 (12.7)
Ambulatory surgery	1,375,400 (5.5)	2,169,000 (8.1)	2,563,440 (8.7)	2,666,640 (8.2)
Emergency room	— (0.0)	— (0.0)	— (0.0)	— (0.0)
Inpt	22,332,240 (88.9)	23,069,760 (85.8)	24,140,940 (81.8)	24,814,400 (76.5)
Totals	25,129,480	26,892,300	29,501,580	32,440,300
Younger than 65:				
Hospital outpt	— (0.0)	— (0.0)	— (0.0)	— (0.0)
Physician office	— (0.0)	49,680 (100.0)	60,680 (100.0)	— (0.0)
Ambulatory surgery	— (0.0)	— (0.0)	— (0.0)	— (0.0)
Emergency room	— (0.0)	— (0.0)	— (0.0)	— (0.0)
Inpt	— (0.0)	— (0.0)	— (0.0)	— (0.0)
Totals	0	49,680	60,680	0

Source: Centers for Medicare and Medicaid Services, 1992, 1995, 1998 and 2001.

rate of inpatient stay than men, reflecting the demographics of the disease. Rates of inpatient admission varied significantly. They were highest in the South most recently, and highest in the Northeast and Midwest in previous years. Healthcare Cost and Utilization Project data indicated similar trends, although the overall rate of inpatient hospital admissions for a diagnosis of upper tract TCC decreased from 5.8/100,000 to 4.5/100,000 population. Most care for upper tract TCC was delivered at urban locations and this rate was also gradually increasing.

Outpatient care. The annualized ambulatory surgery visit rate of the occurrence of upper tract TCC was 2.2/100,000 population according to National Survey of Ambulatory Surgery data (table 9). The rate of visits to ambulatory surgery centers for upper tract TCC increased consistently from 2.7/100,000 population in 1992 to 4.8/100,000 in 2001 (table 10). There was significant variation by gender, which could be explained at least in part by disease demographics. Racial and age trends were unclear, given the small sample size and the small number of nonwhite patients.

Physician office visits did not show any consistent trends. The highest rate in the most recent data occurred in the Midwest. There were also no specific trends in office visit frequency relating to age and gender. Outpatient hospital visits remained steady during a 10-year period, as did the number of visits by gender except in the Northeast, where they decreased sharply.

Economic impact. Total expenditures for upper tract TCC were $64 million in 2000. They peaked in 1998 at $77 million but no clear trend was observed for total expenditures with time. Expenditures related to ambulatory surgery decreased since 1996 and they made up only 8% of total expenditures in 2000. Inpatient services consistently accounted for about 90% of total expenditures throughout the study period.

Expenditures for upper tract TCC in Medicare enrollees 65 years or older increased consistently from $25 million in 1992 to $32 million in 2001 (table 11). Increases in expenditures were driven primarily by increases in inpatient services and physician office visits. Expenditures for physician office visits more than quadrupled from 1992 to 2001 and expenditures for ambulatory surgery almost doubled. While inpatient services accounted for a smaller proportion of total expenditures with time in this population, they still accounted for more than 75% of expenditures in 2001. Expenditures in the Medicare population younger than 65 years were small.

In most years charges for male patients appeared to be much higher than those for female patients. The largest proportion of charges was generated by inpatient care, followed by ambulatory surgery care. Individual level expenditures associated with a diagnosis of upper tract TCC could not be estimated reliably because of small sample size.

CONCLUSIONS

Available data suggest that bladder cancer is a prevalent disease, with the incidence of new cases holding steady in the last 20 years. The rate of inpatient care is decreasing for upper and lower tract cancer, while the use of outpatient care venues, such as office visits and ambulatory surgery centers, is increasing. The use of emergency room care does not appear to be high for this disease and it is limited to elderly patients. Office procedures such as urinalysis and cystoscopy are common but urine cytology seems to be used relatively infrequently. CT is increasingly used as a staging modality before invasive therapy such as cystectomy. Transurethral resection of the tumor is the most frequent treatment approach, typically followed by no additional surgery in the 12 months after initial diagnosis. Cystectomy for bladder cancer is performed in a few individuals, primarily those with higher stage disease. Ileal conduit urinary diversion is the most frequent diversion used following cystectomy. A course of adjuvant intravesical therapy is not commonly administered after transurethral resection of bladder tumors. The use of additional specialists such as medical oncologists to deliver chemotherapy, particularly in patients with advanced disease, is lower than expected. Almost all of these conclusions hold true for upper tract urothelial malignancies as well as lower tract malignancies.

Abbreviations and Acronyms

CPT	=	Common Procedural Terminology
CT	=	computerized tomography
ICD	=	International Classification of Diseases
MRI	=	magnetic resonance imaging
NAMCS	=	National Ambulatory Medical Care Survey
OB	=	obstetric
SEER	=	Surveillance Epidemiology and End Results Program

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