REVIEWS IN UROLOGY

Outpatient Urological Surgery: Outcomes and Cost by Site of Service in Community Practice

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Abstract

Background: Urologic surgery is most commonly performed in 1 of 3 ambulatory settings—a physician office, a hospital outpatient setting, or an ambulatory surgery center—but differences in value among these settings are poorly understood. This study examines real-world practice patterns of community urologists and documents outcomes and costs for a set of common urologic procedures performed in outpatient settings.

Methods: This study sourced deidentified claims data from 2238 health care professionals in 41 urology practices for a 2-year time period (2022-2023). Surgical episodes triggered by 16 common urologic procedures selected by rank frequency were examined; principal metrics were the percentage of episodes with adverse outcomes within 30 days of the procedure and mean episode costs.

Results: A total of 272 395 surgical episodes initiated in ambulatory settings were identified as being performed by 1162 unique health care professionals in 41 practices over the 2-year study period. Most procedures were performed in the hospital outpatient setting (62.8%) or in an ambulatory surgery center (33.2%). Adverse outcomes within 30 days (emergency department visits, hospital visits, postoperative catheterization, and medical billing claims with complications codes) were all substantially less common following procedures in ambulatory surgery centers than following procedures in the hospital outpatient setting. Mean episode costs were significantly lower in ambulatory surgery centers compared with costs in the hospital outpatient setting.

Conclusions: Outpatient urologic procedures performed in ambulatory surgery centers or physician offices have fewer adverse outcomes and lower costs than procedures performed in the hospital outpatient setting.

KEYWORDS:

Ambulatory surgical procedures; urologic diseases; ambulatory care; practice patterns, physicians'

Surgical care in the United States today is less likely to involve hospital admission than it was 20 years ago. Some researchers estimate that 70% of all surgical procedures in the United States are now performed in an ambulatory setting—either a hospital outpatient department (HOPD), a freestanding ambulatory surgery center (ASC), or a physician office.[1] The transition away from inpatient settings has been accompanied by concerns about the impact on the quality and the cost of care. Medicare payment rates for a given outpatient surgical procedure are different for an HOPD (usually highest), an ASC, and a physician office

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(usually lowest), and the Medicare Payment Advisory Commission has issued recommendations to better align payment across these different settings.[2] Commercial payers have similar discordant payment policies. Clinical outcomes by site of service are less well understood, and there are few recent studies of contemporary patterns in the specialty of urology. Hollingsworth et al[3] examined a set of urologic procedures commonly performed in the ambulatory setting between 1998 and 2006 and concluded that fewer complications occurred in the ASC setting but that same-day hospital admissions were more common for the ASC setting than the HOPD setting. Many more major urologic procedures have shifted to the ambulatory setting in the 12 years since this paper was published,[4] and there are now safety and reliability data on some procedures.[5] This study sought to describe the outcomes and relative cost by site of service for urologic procedures commonly performed in ambulatory settings today.

SUMMARY OF MAIN POINTS

- Many urologic procedures can be performed in either an office setting, an ASC, or an HOPD. The majority of common procedures performed by community urologists are done in the most expensive setting: an HOPD. This large study suggests that the physician office or ASC is both a safer and a less expensive setting for common outpatient urologic procedures than the HOPD.
- Policymakers can use this information to align different payment systems and provide financial incentives to use safer and less expensive sites of service for these common procedures.

ABBREVIATIONS

ASC, ambulatory surgery center

ED, emergency department

HOPD, hospital outpatient department

OR, odds ratio

Methods

This retrospective study of anonymized claims did not constitute human subjects research, nor did it violate any human subject protections; informed consent was not sought from patients. Data for the study came from LUGPA, whose members contribute practice management data extracted from their billing systems (ie, claims data). The study and analysis are based on data from the completed claims of 2238 urology professionals in 41 practices for procedure dates of service from January 2022 to December 2023. A total of 16 procedures were selected for analysis primarily based on their rank order of frequency in the ambulatory setting; simple cystoscopy, vasectomy, and prostate biopsy were excluded from the final analysis because of wide interpractice variation in site of service and low incidence of outcomes of interest. The study included all transurethral procedures for benign prostatic hyperplasia because of an interest in outcomes by setting and in previous research in this area.[5] Claims data from all financial classes and payers were included in the study, and the information was properly modified to prevent the identification of individual patients and clinicians. The principal unit of measure was a surgical episode that began on the date of service and lasted 90 days without regard to payer "global periods"; each occurrence of a triggering *Current Procedural Terminology* code generated a new episode, even if it occurred within another episode window.

To examine outcomes the study looked at 4 metrics (percentage of episodes with an event within 30 days of the procedure): (1) emergency department (ED) visits; (2) hospital visits (inpatient or outpatient); (3) urethral catheterizations; and (4) any encounter with the occurrence of 1 or more *International Statistical Classification of Diseases, Tenth Revision*, codes denoting a complication (list of codes available by request). To analyze relative cost, the site-specific Medicare allowable charge for professional fees was first assigned to all services occurring within the 90-day episode (including the index *Current Procedural Terminology* date or day 0). Pathology services billed by urology professionals were excluded because we had no ability to compare costs when they were performed by other professionals at a facility. Facility fees for each episode were assigned using the Medicare Procedure Price Lookup for Outpatient Services software.[6] Professional fees were cross-indexed to the Centers for Medicare & Medicaid Services Physician Fee Schedule.[7]

Our primary interest was in examining differences in outcomes and costs by ambulatory surgical setting. Covariates included patient attributes (index procedure, patient age, patient sex, financial class) and clinician attributes (sex, US Census region, years in practice, and practice size). To examine postoperative outcomes, univariate logistic regression models were constructed for each predictor and each of the 4 metrics of interest. A stepwise approach was then undertaken for a multivariate regression model, where all predictors were initially included in the model but were dropped unless they were significant ($P < .05$). For the regression model examining costs, the same process was undertaken, and a log transformation was performed on the costs as a result of the long tail in distribution stemming from episodes with high costs. The statistical analyses were performed using SAS, version 9.4, software (SAS Institute Inc).

Results

A total of 272 395 surgical episodes initiated in ambulatory settings were identified over the 2-year study period performed by 1162 unique health care professionals in 41 unique practices. Of this total, 170 979 procedures (62.8%) were performed in the HOPD, 90 518 procedures (33.2%) were performed in the ASC, and 10 898 procedures (4.0%) were performed in the physician office (Table 1). The most common procedures in the study were ureteroscopy with

Table 1. Episodes by Place of Service and Procedure Code

Current Procedural Terminology code	*Current Procedural Terminology* description	Common acronym	Physician office (10 898 episodes)	ASC (90 518 episodes)	HOPD (170 979 episodes)	Total ambulatory (272 395 episodes)	Inpatient (23 286 episodes)
50590	Fragmenting of kidney stone	ESWL	2041	25 049	30 963	58 053	801
52234	Cystoscopy and treatment	TURBT, small	1318	4708	7575	13 601	518
52235	Cystoscopy and treatment	TURBT, medium	333	5098	10 980	16 411	1080
52240	Cystoscopy and treatment	TURBT, large	252	2028	6939	9219	1788
52352	Cystourethroscopy with stone removal	Ureteroscopy w/ stone removal	40	4870	9848	14 758	3388
52353	Cystourethroscopy with lithotripsy	Ureteroscopy w/ lithotripsy	47	3470	4924	8441	891
52356	Cystoscopy or ureteroscopy with lithotripsy	Ureteroscopy w/ lithotripsy, stent	862	26 286	57 256	84 404	11 275
52450	Incision of prostate	TUIP	27	303	450	780	21
52601	Prostatectomy (transurethral resection of the prostate)	TURP	259	4812	20 767	25 838	2638
52630	Remove prostate regrowth	TUR residual tissue	41	544	1879	2464	361
52647	Laser surgery of prostate	Laser coagulation prostate	–	16	46	62	5
52648	Laser surgery of prostate	Laser vaporization prostate	762	3258	7649	11 669	183
52649	Prostate laser enucleation	HoLEP	143	134	2522	2799	152
53854	Transurethral destruction of prostate tissue using radiofrequency-generated water vapor thermotherapy	Rezum (Boston Scientific)	4220	509	219	4948	5
54161	Circumcision 28 d or older	Circumcision	463	6161	5404	12 028	98
55040	Removal of hydrocele	Hydrocele repair or removal	90	3272	3558	6920	82

Abbreviations: ASC, ambulatory surgery center; ESWL, extracorporeal shock wave lithotripsy; HoLEP, Holmium laser enucleation of prostate; HOPD, hospital outpatient department; TUIP, transurethral incision of the prostate; TUR, transurethral resection; TURBT, transurethral resection of bladder tumor; TURP, transurethral resection of the prostate.

lithotripsy (31.0%) and shock wave lithotripsy (21.3%). Patients were predominantly younger than 75 years of age (77.3%), male (67.3%), and had commercial insurance (51%) or Medicare (35.8%) (Table 2). Clinician characteristics associated with the episodes are listed in Table 3. Most of the surgical procedures in this dataset originated in 18 practices, with more than 50 physicians (75.8%).

Outcomes are presented as a percentage of episodes in Table 4. Emergency department visits within 30 days of an ambulatory procedure occurred in 0.28% of all episodes, hospital visits in 5.23% of episodes, and catheterizations in 1.97% of episodes. A total of 7.08% of episodes had an encounter within 30 days of the procedure that included a complication code on the claim; the top 11 complications are listed in Table 4. Table 5 displays the information by procedure code.

Multivariate analysis of the principal outcomes is displayed in Table 6 through Table 9. After controlling for other variables, ED visits within 30 days were significantly less likely after procedures performed in an ASC than in an HOPD (odds ratio [OR], 0.340; $P < .001$), but there was no significant difference for this outcome between the physician office and the HOPD (OR, 0.445; $P = .0567$). Hospital visits within 30 days were less frequent in the ASC

Table 2. Episodes by Place of Service and Patient Characteristics

	Physician office (10 898 episodes)	ASC (90 518 episodes)	HOPD (170 979 episodes)	Total (272 395 episodes)
Age band, y				
0-18	74	2427	2010	4511
19-24	81	1494	2362	3937
25-34	298	4557	7561	12 416
35-44	585	8126	13 084	21 795
45-54	1117	13 071	19 855	34 043
55-64	2477	20 484	33 986	56 947
65-74	3314	24 505	48 963	76 782
Subtotal <75	7946	74 664	127 821	210 431
75-84	2290	13 442	33 820	49 552
85-94	614	2346	8959	11 919
≥95	48	66	379	493
Subtotal ≥75	2952	15 854	43 158	61 964
Sex				
Female	2010	30 401	56 644	89 055
Male	8886	60 140	114 380	183 406
Unknown	2	10	35	47
Episode payer class				
Commercial	5483	51897	81 270	138 650
Medicaid	215	3587	8598	12 400
Medicare	4721	28 076	72 742	105 539
Other	479	6958	8369	15 806

Abbreviations: ASC, ambulatory surgery center; HOPD, hospital outpatient department.

Table 3. Episodes by Place of Service and Clinician Characteristics

	Physician office (10 898 episodes)	ASC (90 518 episodes)	HOPD (170 979 episodes)	Total (272 395 episodes)
Clinician sex				
Female	529	3725	8561	12 815
Male	9159	67 024	124 037	200 220
Unknown	1210	19 769	38 381	59 360
Clinician region				
Midwest	5707	38 531	82 592	126 830
Northeast	3644	26 385	35 226	65 255
South	1171	19 762	42 349	63 282
West	376	5828	10 785	16 989
Unknown	0	12	27	39
Clinician time in practice, y				
<20	6776	49 979	85 241	141 996
≥20	617	9983	14 339	24 939
Unknown	3505	30 556	71 399	105 460
Clinician practice size band, No. of MDs				
<50	1343	23 495	40 922	65 760
≥50	9555	67 011	130 030	206 596
Unknown	0	12	27	39

Abbreviations: ASC, ambulatory surgery center; HOPD, hospital outpatient department.

Table 4. Percentage of Episodes With Adverse Outcome,[a] by Place of Service

	Physician office (10 898 episodes), %	ASC (90 518 episodes), %	HOPD (170 979 episodes), %	Total (272 395 episodes), %
ED visit within 30 d	0.07	0.37	0.15	0.28
Hospital visit within 30 d	1.98	7.23	1.83	5.23
Catheter within 30 d	6.35	2.01	1.36	1.97
Complication within 30 d (all)	6.20	7.73	5.96	7.08
Top complications by *International Statistical Classification of Diseases, Tenth Revision,* code				
N39.0 Urinary tract infection, site not specified	5.30	7.15	5.51	6.53
T88.8XXA Other complications of surgical and medical care, not elsewhere classified, initial encounter	0.43	0.04	0.07	0.06
N99.89 Other postprocedural complications and disorders of genitourinary system	0.03	0.04	0.03	0.04
G89.18 Other acute postprocedural pain	0.01	0.04	0.03	0.03
N42.1 Congestion and hemorrhage of prostate	0.03	0.04	0.02	0.03
N99.111 Postprocedural bulbous urethral stricture, male	0.04	0.03	0.01	0.02

Continued

Table 4. Percentage of Episodes With Adverse Outcome,[a] by Place of Service, *Continued*

	Physician office (10 898 episodes), %	ASC (90 518 episodes), %	HOPD (170 979 episodes), %	Total (272 395 episodes), %
N99.840 Postprocedural hematoma of a genitourinary system organ following a genitourinary system procedure	0.00	0.01	0.02	0.02
N99.114 Postprocedural urethral stricture, male, unspecified	0.06	0.01	0.01	0.01
N99.110 Postprocedural urethral stricture, male, meatal	0.01	0.01	0.01	0.01
N99.820 Postprocedural hemorrhage of a genitourinary system organ following a genitourinary system procedure	0.01	0.01	0.01	0.01
N99.115 Postprocedural fossa navicularis urethral stricture	0.01	0.01	0.01	0.01

Abbreviations: ASC, ambulatory surgery center; ED, emergency department; HOPD, hospital outpatient department.

[a] Events within 30 d of procedure index episode.

Table 5. Percentage of Episodes With Adverse Outcome,[a] by Place of Service and Procedure Code

	ED visit within 30 d, %			Hospital visit within 30 d, %			Catheter within 30 d, %			Complication code within 30 d, %		
***Current Procedural Terminology* code**	**Physician office**	**HOPD**	**ASC**	**Physician office**	**HOPD**	**ASC**	**Physician office**	**HOPD**	**ASC**	**Physician office**	**HOPD**	**ASC**
50590	0.20	0.13	0.14	2.69	1.73	1.01	0.00	0.63	0.22	1.47	5.32	4.22
52234	0.00	0.15	0.04	0.91	5.44	1.40	0.76	2.35	1.95	8.95	6.48	6.46
52235	0.00	0.22	0.08	2.40	8.34	2.47	1.50	3.33	3.47	11.71	8.54	9.00
52240	0.40	0.23	0.25	5.56	16.18	5.08	1.19	3.99	4.88	8.73	10.13	10.11
52352	0.00	0.84	0.12	2.50	9.24	2.32	0.00	0.73	0.70	10.00	6.90	6.78
52353	0.00	0.26	0.20	0.00	5.71	2.13	0.00	0.91	0.49	4.26	5.34	4.58
52356	0.00	0.62	0.16	4.64	7.73	2.85	0.81	0.82	0.65	5.34	8.45	6.93
52450	0.00	0.00	0.00	3.70	4.44	0.66	0.00	4.22	4.29	3.70	8.89	8.91
52601	0.00	0.17	0.23	6.18	12.71	1.56	6.95	5.43	5.53	6.95	10.66	9.93
52630	0.00	0.37	0.00	12.20	12.03	1.84	4.88	5.69	2.57	17.07	12.56	11.21
52647	0.00	0.00	0.00	0.00	6.52	0.00	0.00	4.35	12.50	0.00	8.70	25.00
52648	0.13	0.22	0.21	0.79	5.28	1.41	3.54	5.84	5.56	4.86	10.00	8.56
52649	0.00	0.24	0.00	0.70	14.71	2.24	2.10	2.70	5.22	2.10	6.78	11.19
53854	0.05	0.00	0.20	1.33	0.91	1.38	14.50	13.24	16.70	7.99	5.02	5.89
BPH subgroup[b]	0.06	0.19	0.20	1.56	10.93	1.49	12.14	5.37	5.93	7.39	10.26	9.34
	0.18			8.02			6.24			9.76		
54161	0.00	0.13	0.08	0.00	0.76	0.18	1.08	0.46	0.16	2.59	2.52	1.64
55040	0.00	0.31	0.15	1.11	1.49	0.52	0.00	0.45	0.15	0.00	2.45	1.99

Abbreviations: ASC, ambulatory surgery center; BPH, benign prostatic hyperplasia; ED, emergency department; HOPD, hospital outpatient department.

[a] Events within 30 d of procedure index episode.

[b] Subgroup of *Current Procedural Terminology* codes 52450, 52601, 52630, 52647, 52648, 52649, and 53854.

Table 6. Postoperative Emergency Department Visits, Multivariate Analysis

No. of events	Parameter[a]	Category	Odds ratio estimate (95% CI)	Pr > |t|	Type 3 *P* value
10 898	Place of service	Physician office	0.445 (0.194399-1.018757)	.6	<.001
170 979	Place of service	HOPD	[Reference]		
90 518	Place of service	ASC	0.34 (0.275785-0.420089)	<.001	
58 053	*Current Procedural Terminology*	50590	0.382 (0.294697-0.494464)	<.001	<.001
13 601	*Current Procedural Terminology*	52234	0.226 (0.128645-0.397891)	<.001	
16 411	*Current Procedural Terminology*	52235	0.383 (0.258298-0.568782)	<.001	
9219	*Current Procedural Terminology*	52240	0.521 (0.335201-0.810189)	<.01	
14 758	*Current Procedural Terminology*	52352	1.278 (1.004423-1.624824)	.046	
8441	*Current Procedural Terminology*	52353	0.612 (0.384126-0.974879)	.039	
84 404	*Current Procedural Terminology*	52356	[Reference]		
780	*Current Procedural Terminology*	52450	<0.001	<.001	
25 838	*Current Procedural Terminology*	52601	0.333 (0.241293-0.459440)	<.001	
2464	*Current Procedural Terminology*	52630	0.542 (0.252888-1.163136)	.12	
62	*Current Procedural Terminology*	52647	<0.001 (0.000000-3.079089E242)	.97	
11 669	*Current Procedural Terminology*	52648	0.416 (0.270236-0.640434)	<.001	
2799	*Current Procedural Terminology*	52649	0.358 (0.145821-0.881230)	.025	
4948	*Current Procedural Terminology*	53854	0.181 (0.047957-0.685566)	.012	
12 028	*Current Procedural Terminology*	54161	0.227 (0.123811-0.417724)	<.001	
6920	*Current Procedural Terminology*	55040	0.564 (0.338054-0.940703)	.032	
89 055	Sex	Female	0.782 (0.665303-0.918812)	.003	.003
47	Sex	Unknown	<0.001	<.001	
183 406	Sex	Male	[Reference]		
138 650	Payer class	Commercial	1.24 (1.044470-1.472880)	.014	<.001
12 400	Payer class	Medicaid	1.667 (1.229404-2.261174)	.001	
105 539	Payer class	Other	2.358 (1.800617-3.088562)	<.001	
15 806	Payer class	Medicare	[Reference]		
65 255	Region	Northeast	2.29 (1.695172-3.092373)	<.001	<.001
63 282	Region	South	0.786 (0.557533-1.109332)	.17	
16 989	Region	West	0.342 (0.180043-0.650889)	.001	
39	Region	Unknown	–	.9538	
126 830	Region	Midwest	[Reference]		
65 760	Practice size	<50	2.574 (1.889005-3.506073)	<.001	<.001
39	Practice size	Unknown	–		
206 596	Practice size	≥50	[Reference]		

Abbreviations: ASC, ambulatory surgery center; HOPD, hospital outpatient department.

[a] Only significant covariates shown.

Table 7. Postoperative Hospital Visits, Multivariate Analysis

No. of events	Parameter[a]	Category	Odds ratio estimate (95% CI)	Pr > |t|	Type 3 *P* value
10 898	Place of service	Physician office	0.386 (0.325606-0.457956)	<.001	
170 979	Place of service	HOPD	[Reference]		
90 518	Place of service	ASC	0.301 (0.283152-0.320090)	<.001	
61 964	Patient age	≥75 y	1.305 (1.248543-1.363756)	<.001	<.001
210 431	Patient age	<75 y	[Reference]		
58 053	*Current Procedural Terminology*	50590	0.274 (0.252989-0.296837)	<.001	<.001
13 601	*Current Procedural Terminology*	52234	0.51 (0.46068-0.563743)	<.001	
16 411	*Current Procedural Terminology*	52235	1.038 (0.962687-1.119311)	.33	
9219	*Current Procedural Terminology*	52240	2.573 (2.386913-2.774613)	<.001	
14 758	*Current Procedural Terminology*	52352	1.133 (1.052271-1.220601)	.001	
8441	*Current Procedural Terminology*	52353	0.732 (0.650527-0.823045)	<.001	
84 404	*Current Procedural Terminology*	52356	[Reference]		
780	*Current Procedural Terminology*	52450	0.672 (0.436731-1.033880)	.0705	
25 838	*Current Procedural Terminology*	52601	1.746 (1.644929-1.853114)	<.001	
2464	*Current Procedural Terminology*	52630	1.504 (1.293253-1.748506)	<.001	
62	*Current Procedural Terminology*	52647	1.676 (0.490865-5.719422)	.41	
11 669	*Current Procedural Terminology*	52648	0.639 (0.572002-0.713143)	<.001	
2799	*Current Procedural Terminology*	52649	2.143 (1.822198-2.519908)	<.001	
4948	*Current Procedural Terminology*	53854	0.383 (0.285930-0.513725)	<.001	
12 028	*Current Procedural Terminology*	54161	0.095 (0.071486-0.125392)	<.001	
6920	*Current Procedural Terminology*	55040	0.189 (0.148639-0.239976)	<.001	
89 055	Sex	Female	1.056 (1.010373-1.102853)	.015	.0021
47	Sex	Unknown	2.079 (1.203730-3.589485)	.009	
183 406	Sex	Male	[Reference]		
138 650	Payer class	Commercial	0.881 (0.844020-0.919606)	<.001	<.001
12 400	Payer class	Medicaid	1.105 (1.005400-1.214330)	.038	
105 539	Payer class	Other	1.154 (1.058223-1.257486)	.001	
15 806	Payer class	Medicare	[Reference]		
12 815	Clinician sex	Female	1.347 (1.057999-1.716140)	.022	<.001
59 360	Clinician sex	Unknown	0.575 (0.468979-0.705524)	<.001	
200 220	Clinician sex	Male	–		
65 255	Region	Northeast	1.752 (1.507281-2.036113)	<.001	<.001
63 282	Region	South	0.903 (0.764437-1.065596)	.226	
16 989	Region	West	0.504 (0.373399-0.681494)	<.001	
39	Region	Unknown	–	.196	
126 830	Region	Midwest	[Reference]		
65 760	Practice size	<50 MDs	1.323 (1.128520-1.551037)	.0006	.0006
39	Practice size	Unknown	–		
206 596	Practice size	≥50 MDs	[Reference]		
141 996	Time in practice	<20 y	0.752 (0.606508-0.932526)	.009	<.001
105 460	Time in practice	Unknown	1.563 (1.223472-1.996506)	.001	
24 939	Time in practice	≥20 y	[Reference]		

Abbreviations: ASC, ambulatory surgery center; HOPD, hospital outpatient department.

[a] Only significant covariates shown.

Table 8. Postoperative Catheterizations, Multivariate Analysis

No. of events	Parameter[a]	Category	Odds ratio estimate (95% CI)	Pr > |t|	Type 3 *P* value
10 898	Place of service	Physician office	0.717 (0.604490-0.850994)	.001	<.001
170 979	Place of service	HOPD	[Reference]		
90 518	Place of service	ASC	0.817 (0.754048-0.885495)	<.001	
61 964	Patient age	≥75 y	1.599 (1.501906-1.701974)	<.001	<.001
210 431	Patient age	<75 y	[Reference]		
58 053	*Current Procedural Terminology*	50590	0.583 (0.500654-0.677799)	<.001	<.001
13 601	*Current Procedural Terminology*	52234	2.283 (1.969914-2.646576)	<.001	
16 411	*Current Procedural Terminology*	52235	3.673 (3.254290-4.145483)	<.001	
9219	*Current Procedural Terminology*	52240	4.834 (4.221924-5.534060)	<.001	
14 758	*Current Procedural Terminology*	52352	0.889 (0.722033-1.095635)	.27	
8441	*Current Procedural Terminology*	52353	0.934 (0.714981-1.219654)	.62	
84 404	*Current Procedural Terminology*	52356	[Reference]		
780	*Current Procedural Terminology*	52450	4.922 (3.377526-7.174169)	<.001	
25 838	*Current Procedural Terminology*	52601	6.561 (5.932129-7.256777)	<.001	
2464	*Current Procedural Terminology*	52630	5.508 (4.486770-6.762817)	<.001	
62	*Current Procedural Terminology*	52647	11.201 (3.823337-32.813908)	<.001	
11 669	*Current Procedural Terminology*	52648	7.508 (6.628722-8.503658)	<.001	
2799	*Current Procedural Terminology*	52649	4.473 (3.328921-6.011567)	<.001	
4948	*Current Procedural Terminology*	53854	27.475 (22.750136-33.181382)	<.001	
12 028	*Current Procedural Terminology*	54161	0.485 (0.348906-0.673237)	<.001	
6920	*Current Procedural Terminology*	55040	0.433 (0.279763-0.670748)	.01	
138 650	Payer class	Commercial	0.845 (0.790422-0.902324)	<.001	<.001
12 400	Payer class	Medicaid	0.776 (0.622432-0.967555)	.024	
105 539	Payer class	Other	0.971 (0.850303-1.109251)	.67	
15 806	Payer class	Medicare	[Reference]		
12 815	Clinician sex	Female	1.037 (0.805953-1.334531)	.78	.006
59 360	Clinician sex	Unknown	1.373 (1.132580-1.664701)	.001	
200 220	Clinician sex	Male	–		
65 255	Region	Northeast	1.297 (1.129748-1.488045)	.001	<.001
63 282	Region	South	1.423 (1.224737-1.653371)	<.001	
16 989	Region	West	1.287 (1.015622-1.632018)	.037	
39	Region	Unknown	0.088 (0.000017-453.576725)	.58	
126 830	Region	Midwest	[Reference]		
141 996	Time in practice	<20 y	0.886 (0.730164-1.075373)	.22	.02
105 460	Time in practice	Unknown	0.743 (0.593476-0.930974)	.001	
24 939	Time in practice	≥20 y	[Reference]		
65 760	Practice size	<50 MDs	1.323 (1.128520-1.551037)	.0006	.0006
39	Practice size	Unknown	–		
206 596	Practice size	≥50 MDs	[Reference]		
141 996	Time in practice	<20 y	0.752 (0.606508-0.932526)	.0094	<.001
105 460	Time in practice	Unknown	1.563 (1.223472-1.996506)	.0004	
24 939	Time in practice	≥20 y	[Reference]		

Abbreviations: ASC, ambulatory surgery center; HOPD, hospital outpatient department.

[a] Only significant covariates shown.

Table 9. Postoperative Complication Codes, Multivariate Analysis

No. of events	Parameter[a]	Category	Odds ratio estimate (95% CI)	Pr > |t|	Type 3 *P* value
10 898	Place of service	Physician office	0.904 (0.802340-1.017534)	.09	<.001
170 979	Place of service	HOPD	[Reference]		
90 518	Place of service	ASC	0.839 (0.804434-0.875700)	<.001	
61 964	Patient age	≥75 y	1.338 (1.288302-1.389862)	<.001	<.001
210 431	Patient age	<75 y	[Reference]		
58 053	*Current Procedural Terminology*	50590	0.599 (0.568699-0.631435)	<.001	<.001
13 601	*Current Procedural Terminology*	52234	0.824 (0.761249-0.891241)	<.001	
16 411	*Current Procedural Terminology*	52235	1.06 (0.992489-1.132952)	.08	
9219	*Current Procedural Terminology*	52240	1.265 (1.167959-1.369206)	<.001	
14 758	*Current Procedural Terminology*	52352	0.948 (0.881732-1.019510)	.15	
8441	*Current Procedural Terminology*	52353	0.684 (0.614362-0.762331)	<.001	
84 404	*Current Procedural Terminology*	52356	[Reference]		
780	*Current Procedural Terminology*	52450	1.644 (1.261287-2.141805)	.01	
25 838	*Current Procedural Terminology*	52601	1.68 (1.586169-1.778866)	<.001	
2464	*Current Procedural Terminology*	52630	1.972 (1.725222-2.254640)	<.001	
62	*Current Procedural Terminology*	52647	2.099 (0.939905-4.685310)	.0705	
11 669	*Current Procedural Terminology*	52648	1.679 (1.548315-1.819818)	<.001	
2799	*Current Procedural Terminology*	52649	1.272 (1.054123-1.535004)	.01	
4948	*Current Procedural Terminology*	53854	1.458 (1.245012-1.708472)	<.001	
12 028	*Current Procedural Terminology*	54161	0.419 (0.365704-0.480668)	<.001	
6920	*Current Procedural Terminology*	55040	0.391 (0.330555-0.462237)	<.001	
89 055	Sex	Female	2.077 (2.000554-2.156652)	<.001	<.001
47	Sex	Unknown	2.562 (1.449260-4.528273)	<.01	
183 406	Sex	Male	[Reference]		
138 650	Payer class	Commercial	0.738 (0.711500-0.765546)	<.001	<.001
12 400	Payer class	Medicaid	0.718 (0.654069-0.787496)	<.001	
105 539	Payer class	Other	0.75 (0.698384-0.805126)	<.001	
15 806	Payer class	Medicare	[Reference]		
12 815	Clinician sex	Female	1.349 (1.072847-1.695719)	.01	<.001
59 360	Clinician sex	Unknown	1.726 (1.416622-2.101899)	<.001	
200 220	Clinician sex	Male	[Reference]		
65 255	Region	Northeast	1.152 (0.998927-1.329297)	.05	<.001
63 282	Region	South	1.254 (1.070769-1.467601)	.005	
16 989	Region	West	2.09 (1.582092-2.761219)	<.001	
39	Region	Unknown	–	.36	
126 830	Region	Midwest	[Reference]		
65 760	Practice size (No. of MDs)	<50	0.807 (0.692318-0.940806)	.0061	.0061
39	Practice size (No. of MDs)	Unknown	–		
206 596	Practice size (No. of MDs)	≥50	[Reference]		
141 996	Time in practice	<20 y	1.282 (1.044763-1.572530)	.017	<.001
105 460	Time in practice	Unknown	0.877 (0.691562-1.111139)	.28	
24 939	Time in practice	≥20 y	[Reference]		

Abbreviations: ASC, ambulatory surgery center; HOPD, hospital outpatient department.

[a] Only significant covariates shown.

setting (OR, 0.301; $P < .001$) and in the physician office (OR, 0.386; $P < .001$) than in the HOPD. Postoperative catheterizations were also significantly less frequent after procedures in the nonhospital settings (ASC OR, 0.817; $P < .001$; physician office OR, 0.717; $P < .001$) than in the HOPD. Finally, the odds of having a complication code assigned to an encounter within 30 days of a procedure was significantly less likely for procedures done in an ASC (OR, 0.839; $P < .001$) compared with an HOPD; differences between physician offices and HOPDs for this outcome were not significant (OR, 0.904; $P = .0943$).

There were other statistically significant predictors of outcomes in this study as well as some inconsistencies. After controlling for other variables, ED visits were not significantly different by patient age group, but the other 3 outcomes were significantly more common in patients aged 75 years and older ($P < .001$). Female patients were less likely to have an ED visit (OR, 0.782; $P =. 0.0028$) but more likely to have a hospital visit (OR, 1.056; $P = 0.0154$) and more than twice as likely to have a complication diagnosis code (OR, 2.077; $P < .001$) than male patients. Commercially insured patients were more likely to have an ED visit (OR, 1.24; $P = 0.0140$) but less likely to have a hospital visit (OR, 0.881; $P < .001$), catheterization (OR, 0.845; $P < .001$), or complication diagnosis (OR, 0.738; $P < .001$) than were patients insured by Medicare. Similarly significant but inconsistent findings were seen in clinician and practice characteristics.

Relative cost was calculated by using the actual year-specific Medicare allowable charges for all professional services in an episode, and then applying the 2024 national fee information for facility charges to the actual data. Medicare pays more for a given procedure when it is performed in an HOPD (under the Outpatient Prospective Payment System) than in an ASC or a physician office (Table 10). Mean episode costs for all procedures performed in an HOPD were $5156 vs $2831 for ASC and $1426 for a physician office; although there were small differences in professional fees by site of service, facility costs accounted for most of the difference in total cost (Table 11). Costs by site of service are seen in sharp relief at the procedure level (Table 12).

Multivariate analysis confirmed the statistical significance of differences in total episode cost by site of service after adjusting for other variables (Table 13). Compared with an HOPD and after adjusting for other covariates, the estimated cost ratio for procedures done in an ASC was 0.57 and 0.20 for procedures done in a physician office. Other statistical differences in cost were seen by practice region (higher costs in Northeast, $P < .001$), size of practice (higher costs in smaller practices, $P = .0072$), patient age (higher costs in patients 75 years of age and older, $P < .001$), patient sex (higher cost in male patients, $P < .001$), and payer class (higher cost in Medicare, $P < .001$).

Discussion

This large study of community urology practice patterns confirms that common stone, prostate, and genital surgical procedures are usually performed in the outpatient setting (92% of the procedures selected for this analysis), with low rates of adverse outcomes. Medicare and other insurers pay significantly more for the same procedures performed in an HOPD than in a physician office or ASC, with no demonstrated benefit for this additional cost. The current analysis helps quantify these differences—most of which are secondary to the facility fee alone—and reaffirm existing findings in the literature, which show lower costs in the ASC or physician office setting.[8] This study did not find evidence that lower procedural costs in the ASC or office setting led to higher utilization costs of professional services in the first postoperative 90 days. Moreover, this study showed that ED visits, hospital visits or admissions, catheterizations, and complication billing codes were significantly more likely after a procedure performed in the more expensive HOPD setting than in the less expensive ASC or physician office setting. These findings compare favorably with those of other similar studies: The current study's unadjusted overall rate of ED visits and hospital visits following stone procedures (6.6%) is nearly identical to that documented by Michel et al[9] in their examination of ambulatory

Table 10. 2024 National Fees for Ambulatory Urological Surgery, by Site of Service

	Medicare Physician Fee Schedule, $		Medicare Procedure Price Lookup Tool Ambulatory Payment Classification, $			Professional and facility charge, by site of service, $		
***Current Procedural Terminology* code**	**Nonfacility price**	**Facility price[a]**	**Physician fee[a]**	**ASC fee**	**HOPD fee**	**Physician office**	**ASC**	**HOPD**
50590	740.98	570.88	561.00	1626.00	3321.00	740.98	2187.00	3882.00
52234	NA	241.33	237.00	1626.00	3321.00	241.33	1863.00	3558.00
52235	NA	283.28	278.00	1626.00	3321.00	283.28	1904.00	3599.00
52240	NA	384.47	378.00	2471.00	4930.00	384.47	2849.00	5308.00
52352	NA	347.19	341.00	1626.00	3321.00	347.19	1967.00	3662.00
52353	NA	384.14	377.00	2471.00	4930.00	384.14	2848.00	5307.00
52356	NA	407.44	400.00	2471.00	4930.00	407.44	2871.00	5330.00
52450	NA	475.35	467.00	1626.00	3321.00	475.35	2093.00	3788.00
52601	NA	723.34	711.00	2471.00	4930.00	723.34	3182.00	5641.00
52630	NA	406.11	399.00	2471.00	4930.00	406.11	2870.00	5329.00
52647	1556.19	647.44	636.00	2471.00	4930.00	1556.19	3107.00	5566.00
52648	1604.79	689.72	678.00	2471.00	4930.00	1604.79	3149.00	5608.00
52649	NA	820.20	806.00	2471.00	4930.00	820.20	3277.00	5736.00
53854	1654.06	382.14	375.00	1408.00	3321.00	1654.06	1783.00	3696.00
54161	NA	197.06	193.00	929.00	1940.00	197.06	1122.00	2133.00
55040	NA	339.87	334.00	1621.00	3296.00	339.87	1955.00	3630.00

Abbreviations: ASC, ambulatory surgery center; HOPD, hospital outpatient department; NA, not applicable.

[a] Minor differences for facility professional fees were seen comparing Medicare Physician Fee and Ambulatory Payment Classification schedules.

surgery for kidney stones (6.4%); the combined ED visit rate of 0.28% for the current study's 16 procedures is much lower than in a similar study by Witherspoon[10] of outpatient surgery in Canada (16%); our study's ED visit and hospital visit rates for this entire set of procedures are slightly higher (5.51%) than that of a study by Rambachan et al[11] (3.7%) examining "readmissions" (our study counted outpatient and inpatient visits in its metric). The current study also adds to the body of literature regarding outpatient surgery for benign prostatic hyperplasia. In a meta-analysis of 20 studies of outpatient benign prostatic hyperplasia surgery, Salciccia et al[5] found an overall event rate for postoperative complications and early postoperative visits of almost 19%; the current study's work showed an overall event rate of 16.44% (ED visits, 0.18%; hospital visits, 8.02%; and catheterizations, 6.24%) (Table 5). In summary, our work supports that of other authors, who have found that many urologic procedures can be performed safely in an ASC or physician office with outcomes and costs that are favorable compared with the HOPD setting.[3,5,12] Although our study did find significant associations between outcomes and certain patient and clinician characteristics, these findings were inconsistent across those outcomes and not directly comparable with previous studies.

Table 11. Mean Episode Costs for Ambulatory Urological Surgery, by Fee Category and Site of Service[a]

	Physician office (10 898 episodes), mean cost, $	HOPD (170 979 episodes), mean cost, $	ASC (90 518 episodes), mean cost, $	Total (272 395 episodes), mean cost, $
Physician fee index *Current Procedural Terminology* code	1122	502	489	522
Professional fees other surgery	134	191	174	183
Professional fees evaluation and management	75	113	92	104
Professional fees medicine	10	2	2	2
Professional fees Healthcare Common Procedure Coding System	34	64	62	62
Professional fees labwork[a]	22	19	23	20
Professional fees radiology	27	29	34	31
Professional fees total	1425	919	875	924
Facility fee (estimated)	–	4237	1956	3447
Episode cost	1426	5156	2831	4234

Abbreviations: ASC, ambulatory surgery center; HOPD, hospital outpatient department.

[a] Professional fees for pathology services excluded.

Table 12. Estimated Mean Total Episode Costs for Ambulatory Urological Surgery, by *Current Procedural Terminology* Code and Site of Service[a]

Current Procedural Terminology code	Physician office, mean cost, $	HOPD, mean cost, $	ASC, mean cost, $
50590	1081	4214	2520
52234	715	4296	2574
52235	1071	4437	2897
52240	987	6404	3962
52352	804	4109	2384
52353	784	5592	3198
52356	892	5833	3375
52450	707	4026	2314
52601	1126	5985	3565
52630	855	5674	3336
52647	0	5860	3387
52648	2076	5875	3403
52649	1023	5932	3691
53854	2052	3876	2028
54161	348	2266	1242
55040	519	3734	2057

Abbreviations: ASC, ambulatory surgery center; HOPD, hospital outpatient department.

[a] Professional fees for pathology services excluded.

Table 13. Episode Cost Multivariate Analysis

No. of episodes	Parameter[a]	Category	Log episode cost ± SE	95% CI for parameter estimate	Estimated cost ratio	Pr > |t|	Type 3 *P* value
10 898	Place of service	Physician office	−1.613478 ± 0.002253	−1.617894 to −1.609061	0.199	<.001	<.001
170 979	Place of service	HOPD	[Reference]				
90 518	Place of service	ASC	−0.554896 ± 0.000885	−0.556631 to −0.553161	0.574	<.001	
61 964	Patient age	≥75 y	0.008282 ± 0.000880	0.006558 to 0.010007	1.008	<.001	<.001
210 431	Patient age	<75 y	[Reference]				
58 053	*Current Procedural Terminology*	50590	−0.305978 ± 0.001010	−0.307958 to −0.303998	0.736	<.001	<.001
13 601	*Current Procedural Terminology*	52234	−0.384265 ± 0.001631	−0.387463 to −0.381067	0.681	<.001	
16 411	*Current Procedural Terminology*	52235	−0.289938 ± 0.001501	−0.292881 to −0.286996	0.748	<.001	
9219	*Current Procedural Terminology*	52240	0.062528 ± 0.001910	0.058785-0.066271	1.065	<.001	
14 758	*Current Procedural Terminology*	52352	−0.352049 ± 0.001528	−0.355044 to −0.349055	0.703	<.001	
8441	*Current Procedural Terminology*	52353	−0.046084 ± 0.002011	−0.050026 to −0.042143	0.955	<.001	
84 404	*Current Procedural Terminology*	52356	[Reference]				
780	*Current Procedural Terminology*	52450	−0.384566 ± 0.006137	−0.396594 to −0.372538	0.681	<.001	
25 838	*Current Procedural Terminology*	52601	0.015015 ± 0.001312	0.012443-0.017588	1.015	<.001	
2464	*Current Procedural Terminology*	52630	−0.056039 ± 0.003500	−0.062898 to −0.049180	0.946	<.001	
62	*Current Procedural Terminology*	52647	0.026162 ± 0.021889	−0.016740 to 0.069064	1.027	.232	
11 669	*Current Procedural Terminology*	52648	0.024914 ± 0.001845	0.021298-0.028530	1.025	<.001	
2799	*Current Procedural Terminology*	52649	0.017703 ± 0.003910	0.010040-0.025367	1.018	<.001	
4948	*Current Procedural Terminology*	53854	0.388727 ± 0.003225	0.382406-0.395049	1.475	<.001	
12 028	*Current Procedural Terminology*	54161	−0.990486 ± 0.001874	−0.994159 to −0.986813	0.371	<.001	
6920	*Current Procedural Terminology*	55040	−0.474863 ± 0.002158	−0.479092 to −0.470634	0.622	<.001	
89 055	Sex	Female	−0.011876 ± 0.000772	−0.013389 to −0.010363	0.988	<.001	<.001
47	Sex	Unknown	−0.119796 ± 0.013352	−0.145967 to −0.093626	0.887	<.001	
183 406	Sex	Male	[Reference]				
138 650	Payer class	Commercial	−0.009986 ± 0.000778	−0.011510 to −0.008462	0.990	<.001	<.001
12 400	Payer class	Medicaid	−0.017025 ± 0.001756	−0.020467 to −0.013583	0.983	<.001	
105 539	Payer class	Other	−0.025901 ± 0.001579	−0.028996 to −0.022806	0.974	<.001	
15 806	Payer class	Medicare	[Reference]				
12 815	Clinician sex	Female	0.003797 ± 0.005382	−0.006752 to 0.014347	1.004	.4805	.0102

Continued

Table 13. Episode Cost Multivariate Analysis *, Continued*

No. of episodes	Parameter[a]	Category	Log episode cost ± SE	95% CI for parameter estimate	Estimated cost ratio	Pr > |t|	Type 3 *P* value
59 360	Clinician sex	Unknown	−0.009608 ± 0.003387	−0.016247 to −0.002970	0.990	0.0046	
200 220	Clinician sex	Male	[Reference]				
65 255	Region	Northeast	0.025087 ± 0.003258	0.018701-0.031472	1.025	<.0001	<.0001
63 282	Region	South	−0.003749 ± 0.003652	−0.010906 to 0.003408	0.996	0.3046	
16 989	Region	West	−0.013483 ± 0.006559	−0.026338 to −0.000627	0.987	0.0398	
39	Region	Unknown	0.052320 ± 0.049757	−0.045202 to 0.149842	1.054	0.293	
126 830	Region	Midwest	[Reference]				
65 760	Practice size (No. of MDs)	<50	0.009495 ± 0.003532	0.002573-0.016417	1.010	0.0072	.0072
39	Practice size	Unknown					
206 596	Practice size (No. of MDs)	≥50	[Reference]				

Abbreviations: ASC, ambulatory surgery center; HOPD, hospital outpatient department.

[a] Professional fees for pathology services excluded.

This study has important implications for patients, clinicians, payers, and policymakers. Because the most common insurance paradigm (including fee-for-service Medicare) involves patient co-insurance, a patient may face substantially higher out-of-pocket costs if a procedure is performed at an HOPD rather than at an ASC or a physician office. The study furthermore found that adverse outcomes were 1.2 to 3 times more likely if these procedures were performed in an HOPD vs an ASC. It was not possible to capture or estimate the cost of these outcomes beyond the urologists' professional fees, but they are believed to be substantial. For example, an ED visit after a stone procedure would likely involve professional fees from the ED physician and radiologist, facility fees for radiology and supplies, intravenous fluids and medications, and perhaps even hospital admission. The finding that complication billing codes were appended to encounters following procedures done in an HOPD at a higher rate than those done in an ASC has implications for patients in Medicare Advantage programs, where charges and payments are often linked to measures of disease "severity" supported by these codes. Finally, the payment differential between an HOPD and other ambulatory settings has other consequences that can exacerbate the financial impact to the health care system. For example, hospitals may be incentivized by the current payment schedule to shift care from an ASC (joint venture) to the HOPD or to acquire practices for that purpose. For all these reasons the study's approximations of relative cost differences—and the potential for cost savings with policy changes—are probably underestimates.

This study has limitations. The choice of procedures included in this analysis may have produced results that are not generalizable to other outpatient procedures. Some urology practices are able to offer surgical procedures in the office setting while others are not, and clinician access to an ASC is not equal across practice settings; it was not possible to identify or control for these structural differences in the analysis. We had no access to clinical comorbidities, American Society of Anesthesiologists classification, or other measures of patient acuity that could contribute to patterns of utilization of hospital sites. *International Statistical Classification of Diseases, Tenth Revision*, codes signifying complications may be used differently by different physicians and may not always indicate a true clinical condition. The

study's data cannot be used to determine actual costs or compare costs across different payers. Claims data outside the urology practice were not accessible, so assumptions about relative facility costs based on Medicare's Ambulatory Payment Classification system were made; actual costs of ED visits, hospital visits, and nonurologic care were unknown.

Conclusions

Many urologic procedures can be safely performed in the ambulatory setting. This large study based on real-world evidence suggests that the physician office or ASC is a safer and less expensive setting for common outpatient urologic procedures compared with the HOPD. This study may assist policymakers and other stakeholders concerned with reforming payment systems to improve outcomes and reduce costs.

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