

Could Operating-Room Time Differences for Lithotripsy be an Indicator of Healthcare Access?

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BACKGROUND

- Urolithiasis is a common urological condition associated with high morbidity.
- It is commonly treated with outpatient lithotripsy using thulium fiber (TFL) or holmium: YAG (Ho:YAG) lasers.
- Operating-room (OR) time is an outcome indicator of complexity of the procedure.
- Studies have shown shorter OR-time for TFL vs. Ho:YAG; none employed nationally representative real-world data.

AIM

Using the Premier healthcare data (PINC™ AI) (2021-2025 q2), this study compared OR-time for TFL and Ho:YAG lasers and studied healthcare access variables that influence lithotripsy.

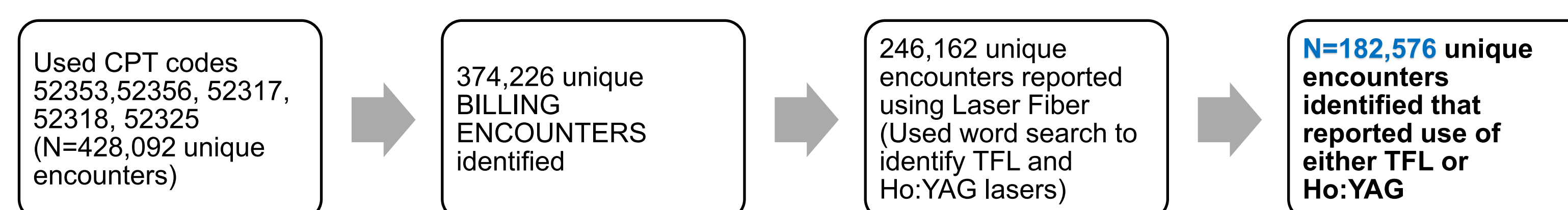
METHODS

- Patients undergoing lithotripsy were identified via CPT codes:
 - 52353 - Cystourethroscopy, with ureteroscopy and/or pyeloscopy; with lithotripsy (ureteral catheterization is included)
 - 52356 - Cystourethroscopy, with ureteroscopy and/or pyeloscopy; with lithotripsy including insertion of indwelling ureteral stent
 - 52317 - Litholapaxy: crushing or fragmentation of calculus by any means in bladder and removal of fragments; simple or small (< 2.5 cm)
 - 52318 - Litholapaxy: crushing or fragmentation of calculus by any means in bladder and removal of fragments; complicated or large (> 2.5 cm)
 - 52325 - Cystourethroscopy (including ureteral catheterization); with fragmentation of ureteral calculus
- Laser type determined from chargemaster file using key word search
- Independent variables:
 - Laser type
 - Socio-economic factors: age, gender, health insurance type, race, ethnicity,
 - Clinical factors: admission type, Charlson's comorbidity scores, Elixhauser scores, discharge status
 - Facility characteristics: facility size, and teaching status
- Outcome variable:
 - OR time in minutes
- OR time was calculated using chargemaster file
- Given the skewed nature of OR time, data were divided at median (≤69 mins and ≥70mins)
- Analyses comprised descriptive statistics and statistical models
 - Bivariate model was followed by multivariate model
 - Generalized linear models (GLMs) accounted for clustering, and used a normal distribution with identity link, significance was defined at p<0.05
- Analysis done using SAS 9.4

RESULTS

- From 2021–2025 q2, 182,576 unique encounters were identified; **99.6% (N=181,920)** were outpatient, so analyses focused on outpatient encounters.

Figure 1. Description of selection of unique encounters/discharges



- In both laser type groups (**table 1**), there were more females than male, the procedure was mostly elective, most of the patients were discharged to home, the comorbidity scores (Elixhauser and Charlson) were higher for TFL, and teaching hospitals mostly used Ho:YAG.

CONTACTS

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Table 1: Describing patient characteristics of outpatient (N=181,920) cases

Patient Characteristics		Ho:YAG (N=151,299)	TFL (N=30,621)	P-value
Age (in yrs.)	Mean (SD)	58 (16.0)	59 (15.8)	<.0001
	Sex			0.0583
Sex	Male	77,388 (53.3%)	14,932 (52.5%)	
	Female	67,846 (46.7%)	13,488 (47.5%)	
Admit Type	Emergency	13,964 (9.6%)	2,534(8.9%)	<.0001
	Urgent	2,236(1.5%)	435(1.5%)	
	Elective	118,946 (82%)	22,165(78%)	
Race	White	119,613 (82.4%)	24,325 (85.6%)	<.0001
	Black	9,252 (6.4%)	1,492 (5.3%)	
	Asian	3,830 (2.6%)	760 (2.7%)	
Ethnicity	Hispanic	12,147 (8.4%)	2,222 (7.8%)	<.0001
	Discharge Status			<.0001
Discharge Status	Discharged To Home or Self Care	143,093 (98.5%)	28,037 (98.7%)	
	Discharged/Transferred to Other Facility	102(0.07%)	8 (0.03%)	
	Discharged/Transferred to SNF	798(0.6%)	174 (0.6%)	
Payor-mix	Commercial	17,794 (12.3%)	4,729 (16.6%)	<.0001
	FFS Medicaid	3,974 (2.7%)	656 (2.3%)	
	FFS Medicare	28,742 (19.8%)	5,835 (20.5%)	
	Mgd care Commercial	45,099 (31.1%)	7,179 (24.7%)	
	Mgd care Medicaid	11,109 (7.7%)	2,381 (8.4%)	
	Mgd care Medicare	29,498 (20.3%)	6,289 (22.1%)	
	Other	6,378 (4.4%)	836 (2.9%)	
Charlson comorbidity index	Mean (SD)	0.54 (0.85)	0.62 (0.92)	<.0001
	Elixhauser score	Mean (SD)	1.36 (1.47)	1.48 (1.51)
Facility characteristics	Teaching status			<.0001
	Bed Size			<.0001
Teaching status	No	71,954 (49.5%)	16,936 (59.6%)	
	Yes	73,282 (50.5%)	11,484 (40.4%)	
Bed Size	000-099	9,544 (6.6%)	3,581 (12.6%)	<.0001
	100-199	29,806 (20.5%)	3,993 (14.1%)	
	200-299	29,492 (20.3%)	4,866 (17.1%)	
	300-399	22,393 (15.4%)	6,283 (22.1%)	
	400-499	10,536 (7.3%)	3,625 (12.8%)	
	500+	43,465 (29.9%)	6,072 (21.4%)	

- Table 2 describes the percentile distribution of OR time and the cut-off used in grouping OR time
- Tables 3 (a) and 3(b) describe the OR time distribution by laser type using 0-50th percentile and 51st – 99th percentile as two groups of OR time

Table 2: Operating room (OR) time distribution

Range (mins)	Percentile
2 - 56	0-25 th
57 - 69	26 th -50 th
70 - 90	51 st -75 th
91 - 120	75 th - 90 th
121 - 150	90 th - 95 th
151 - 300	95 th - 99 th

Table 3 (a): OR time (min) for 0 – 50th Percentile

	Coefficient	Std. Error	P-value
Intercept (TFL)	52.30	0.09	<.0001
Tech			
Ho:YAG (N= 68,453)	-0.52	0.1	<.0001
TFL (ref) (N=13,860)	0		

Table 3 (b): OR time (min) for 51st – 99th Percentile

	Coefficient	Std. Error	P-value
Intercept (TFL)	100.9	0.27	<.0001
Tech			
Ho:YAG (N=52,121)	3.7	0.30	<.0001
TFL (Ref) (N=8,462)	0		

- For OR-time ≤69 minutes, TFL and Ho:YAG showed similar durations
- For OR-time ≥70-300 minutes, **TFL was significantly shorter** by ~4 minutes (p<0.05).
- Among socioeconomic, clinical and facility characteristics; bed-size had a notable influence.
 - Bed-size/facility size reduced the OR time by 1 minute after it was adjusted for in the multivariate model.

- Table 5 describes the influence of laser type after adjusting for socioeconomic, clinical and facility characteristics on OR time, given OR time is (51st-99th percentile)
 - Females reported 4.3 min (p<0.05) shorter OR-times than males, elective procedures ~10 min (p<0.05) longer than emergency procedures, and a point increase in Elixhauser score increased OR-time by 0.3 min (p<0.05).

Table 5: Influence of socio-economic, clinical and facility characteristics on OR time (51st – 99th Percentile)

	Coefficient	Std. Error	P-value	P-value (overall)
Intercept	101.14	0.88	<.0001	
Tech				
Ho:YAG	0.92	0.35	0.0088	
TFL (Ref)	0			
Gender				
Female	-4.25	0.26	<.0001	
Male (ref)	0			
Age	0.09	0.01	<.0001	
Elixhauser score	0.27	0.09	0.0027	
Admission Type				<.0001
Emergency	-10.45	0.36	<.0001	
Urgent	-8.18	0.88	<.0001	
Elective (ref)	0			
Race				<.0001
Asian	1.31	0.82	0.1099	
Black	5.3	0.52	<.0001	
Other	4.97	0.62	<.0001	
White (ref)	0			
Hispanic				
No	2.4	0.46	<.0001	
Yes (ref)	0			
Payor-mix				<.0001
Commercial	-2.79	0.42	<.0001	
FFS Medicaid	2.82	0.88	0.0014	
FFS Medicare	0.05	0.44	0.9189	
Mgd care Medicaid	4.66	0.56	<.0001	
Mgd care Medicare	1.39	0.43	0.0012	
Other	1.91	0.69	0.0057	
Other Govt	-0.45	0.99	0.6469	
Workers Comp	-3.57	5.69	0.5306	
Mgd care Commercial (ref)	0			
Bed Size				<.0001
000-099	-8.8	0.53	<.0001	
100-199	-3.69	0.43	<.0001	
200-299	-10.38	0.42	<.0001	
300-399	-7.19	0.42	<.0001	
400-499	-7.62	0.48	<.0001	
500+ (ref)	0			
Teaching				
Yes	0.89	0.3	0.0029	
No (ref)	0			

- In the multivariate model, adjusting for Bed Size reduced Ho:YAG minutes from ~2 mins to ~1 min, demonstrating the influence of facility size on laser technology.

CONCLUSION

In addition to laser type, **facility size and patient socioeconomic and clinical characteristics** were significant contributors to operating room time differences, underscoring **potential gaps in healthcare access** that merit further study.

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