

Real-world Practice Stone-free Rates after Ureteroscopy from a Surgical Collaborative: Much to Improve

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INTRODUCTION AND OBJECTIVE: The stone-free rate (SFR) is an important outcome measure of quality after ureteroscopy for urinary stones. Recent studies show SFRs may not be as high as previously reported. However, these studies are from expert centers, and data from real-world community practice is lacking. We examined the SFR and its predictors following ureteroscopy among diverse practices in the state of Michigan.

METHODS: We used the Michigan Urological Surgery Improvement Collaborative (MUSIC) Reducing Operative Complications from Kidney Stone (ROCKS) registry to identify ureteroscopy cases for renal and ureteral stone location, respectively, treated between 2016 and 2021, that had postoperative imaging. Stone-free was defined as no fragment detected on imaging within 60 days. Practice and surgeon-level SFR variation was assessed. Surgeon volume was categorized according to quartiles of annual volume. Factors associated with SFR were examined using logistic regression.

RESULTS: 6,487 ureteroscopies were performed across 29 practices and 164 surgeons, to treat 2,091 (32.2%) renal and 4396 (67.8%) ureteral stones. The SFR was 49.6% and 72.7% for renal and ureteral stone location, respectively. For renal stones, larger stone size, lower pole location, and multiplicity were significantly associated with residual fragments (**Table 1**). For ureteral stones, female gender, larger stone size, proximal location, multiplicity, positive urine culture, use of ureteral access sheath, and post-ureteroscopy stenting were predictors for low SFR (**Table 1**). No significant differences in SFRs were identified regarding pre-stenting and surgeon volume. Surgeon variation in the SFR for renal and ureteral stones, when adjusted for risk factors, was 29.0-68.7% ($p<0.0001$) and 51.4-86.4% ($p<0.0001$), respectively (**Figure 1**).

CONCLUSIONS: There is substantial surgeon-level variation in the SFR after ureteroscopy in Michigan. Our findings demonstrate the need for quality efforts to improve these outcomes.

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Table 1. Multivariable model assessing the odds of stone-free after ureteroscopy for renal and ureteral stones treated in the Michigan Urological Surgery Improvement Collaborative.

	Renal Stone			Ureteral stone		
	OR	95% CI	p-value	OR	95% CI	p-value
Age (vs mean)	0.995	0.99-1.00	0.1853	0.998	0.99-1.00	0.4422
Female (vs male)	1.121	0.91-1.38	0.2970	0.833	0.71-0.97	0.0191
BMI:			0.8256			0.4069
25-29 (vs <25)	1.149	0.86-1.53		0.992	0.80-1.23	
30-34 (vs <25)	1.131	0.84-1.53		1.031	0.83-1.29	
35-39 (vs <25)	1.154	0.82-1.63		1.183	0.90-1.55	
≥40 (vs <25)	0.993	0.70-1.40		1.260	0.94-1.68	
CCI:			0.8621			0.3198
1 (vs 0)	0.935	0.72-1.22		0.962	0.79-1.20	
2 or greater (vs 0)	1.120	0.84-1.50		0.837	0.68-1.09	
Insurance:			0.5516			0.2438
Public (vs private)	0.886	0.72-1.10		0.883	0.75-1.04	
None (vs private)	0.777	0.33-1.86		0.754	0.40-1.41	
Stone size:			<0.0001			<0.0001
5-10mm (vs <5mm)	0.697	0.53-0.92		0.631	0.53-0.75	
10-15mm (vs <5mm)	0.487	0.35-0.67		0.405	0.31-0.53	
>15mm (vs <5mm)	0.366	0.24-0.55		0.230	0.14-0.37	
Urine culture:						0.0066
Positive (vs. negative)				0.746	0.61-0.92	
Not performed (vs. negative)				0.798	0.64-1.00	
Proximal stone (vs. distal)	NA		NA	0.752	0.64-0.89	0.0008
Lower pole (vs. non-lower pole)	0.680	0.55-0.83	0.0002	NA		NA
Multiple stones (vs single stone)	0.688	0.54-0.88	0.0028	0.529	0.37-0.75	0.0003
Use of UAS				0.801	0.67-0.96	0.0139
Post-URS stenting (vs no stent)				0.784	0.64-0.96	0.0169

OR=odd ratio; CI=confidence interval; BMI=body mass index; CCI=Charlson comorbidity index; NA=not available; UAS=ureteral access sheath

Figure 1. Surgeon variation in the adjusted SFR for (a) renal stones and (b) ureteral stones treated with ureteroscopy in the Michigan Urological Surgery Improvement Collaborative.

