in a tank of 37C deionized (DI) water to simulate core body temperature. A 230 μm core laser fiber extending 5 mm from the tip of a LithoVue ureteroscope was positioned in the center of the model. Irrigation settings of 0, 8, 15, and 40 ml/min with room temperature DI water were used while a P120 Ho:YAG laser was activated for 60 seconds at 40W (0.5 J x 80 Hz, SP). Temperature was measured every second by a thermocouple affixed 5 mm from the tip of the ureteroscope. 5 trials were run under each parameter. Thermal dose was calculated from the temperature curves using the Dewey and Sapareto t43 methodology with t43 = 120 equivalent minutes accepted as the threshold for thermal injury.

RESULTS: The rate of temperature elevation and thermal dose from laser activation were inversely proportional to the volume of fluid in each model and the irrigation rate. The time to threshold for thermal injury was only 3 seconds for the smallest model (0.5 ml) without irrigation, while it was never reached in the largest model (60.8 mL), regardless of irrigation rate (table). 40 ml/min irrigation maintained safe temperatures below the threshold for injury in all models (figure).

CONCLUSIONS: Clinicians should be mindful when using high power laser settings in confined calyxes, or tight spaces as heating of small volume fluid to dangerous levels can occur quickly.

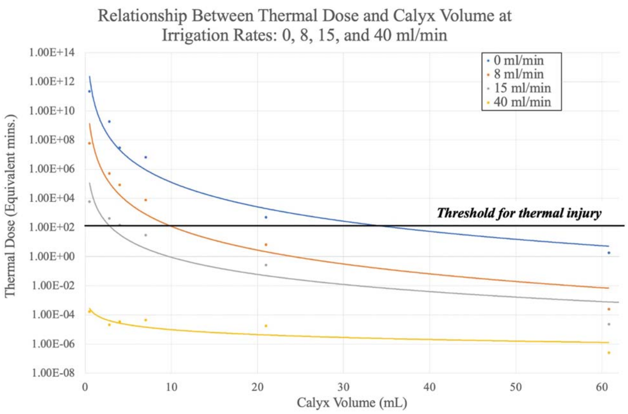

Table: Time to reach threshold for thermal injury (seconds)

Irrigation Rate	*Calyx model volumes*					
	0.5 mL	**2.8 mL**	**4.0 mL**	**7.0 mL**	**21.0 mL**	**60.8 mL**
0 ml/min	3	10	12	20	58	---
8 ml/min	7	18	23	39	---	---
15 ml/min	15	38	56	---	---	---
40 ml/min	---	---	---	---	---	---

Source of Funding: Research grant from Boston Scientific

PD41-07
ERGONOMICS IN THE OR: AN ELECTROMYELOGRAPHIC EVALUATION OF COMMON MUSCLE GROUPS USED DURING SIMULATED FLEXIBLE URETEROSCOPY

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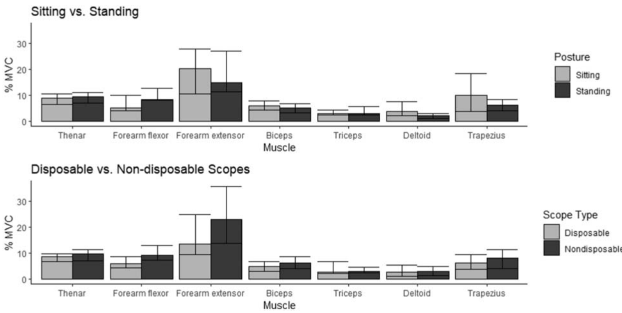
INTRODUCTION AND OBJECTIVE: Ergonomics in flexible ureteroscopy is poorly understood. We sought to assess the effects of different surgeon positions (sitting vs. standing) and ureteroscope types (disposable vs. non-disposable) on muscle activation as measured on electromyography (EMG) during ureteroscopy in an endourology box-trainer model and kidney phantom.

METHODS: For this exploratory study, EMG was used to quantify muscle activation of three endourologists during various ureteroscopic tasks. Surface EMG electrodes (ADInstruments, Colorado Springs, CO) were placed on the scope-holding side of the following muscle groups: thenar, forearm flexor, forearm extensor, biceps, triceps, deltoid, and trapezius. “Real world” operative settings were re-created: subjects wore fitted lead aprons in an operating room suite and used a cystoscopy table with surgical drapes and an endoscopic video tower. Subjects completed each trial while sitting and standing, and while using a disposable and non-disposable scope. Each subject performed an identical set of tasks in a phantom silicone kidney and ureteroscopy box trainer used to recreate the procedural components of dusting, basketing, and navigating a renal collecting system. Raw EMG data for each task was processed and normalized as a percent of each subject's maximum voluntary contraction (MVC) to allow comparison. The EMG activity of all subjects and tasks were compiled (Figure 1). Tasks were analyzed individually and then in aggregate because muscle activation trends were similar and a complete set of tasks better represented a ureteroscopy procedure.

RESULTS: The forearm extensor was the most heavily utilized muscle regardless of posture or scope type. The trapezius muscle was activated more during sitting vs. standing. The forearm extensor muscle was activated more with the heavier non-disposable scope vs. the disposable scope.

CONCLUSIONS: Our preliminary data show differences in muscle activation based on both surgical posture and type of scope used. This highlights the need for larger and more extensive EMG studies to identify techniques and equipment to optimize ergonomics and potentially minimize repetitive use injury during flexible ureteroscopy.



Source of Funding: None

PD41-08
THE COST OF CONVENIENCE: ESTIMATING THE ENVIRONMENTAL IMPACT OF SINGLE-USE AND REUSABLE FLEXIBLE CYSTOSCOPES

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INTRODUCTION AND OBJECTIVE: Flexible cystoscopy is one of the most common outpatient procedures performed in urology practices. Single-use flexible cystoscopes may confer cost savings associated with reduced device reprocessing and repair. However, the environmental impact of disposable devices is not well-characterized. This study aimed to compare the carbon footprint of single-use (SU) and reusable flexible cystoscopes.

METHODS: We analyzed the expected life cycle of SU (Ambu aScope 4 Cysto) and reusable (Olympus CYF-V2) flexible cystoscopes. Performance data on cumulative procedures between repairs and before decommissioning were derived from a high-volume multispecialty practice; to simulate practices with lower and higher volumes, we also estimated life cycle costs at 50% and 200% of case volumes. We estimated carbon expenditures per case using published data on endoscope manufacturing, energy consumption during reprocessing, and solid waste disposal.

RESULTS: Our fleet of 16 reusable cystoscopes in service for up to 135 months averaged 207 cases between repairs and 3920 cases per life cycle. Based on a manufacturing carbon footprint of 11.5 kg CO_2/kg device for flexible endoscopes, the per-case manufacturing cost was 1.84 kg CO_2 for SU devices and 0.0001 kg CO_2 for reusable devices (Table). The solid mass of SU and reusable devices was 0.16 and 0.57 kg, respectively. The energy consumption of device reprocessing using an automated endoscope reprocessor was 0.45 kg CO_2. Per-case costs of device repackaging and repair were 0.005 and 0.02 kg CO_2.The total estimated per-case carbon footprint of SU and reusable devices was 2.30 and 0.48 kg CO_2, respectively. The estimated footprint of reusable devices at 50%−200% of case volume assumptions was not meaningfully different (0.47−0.51 kg CO_2).

CONCLUSIONS: The environmental impact of reusable flexible cystoscopes is markedly less than SU cystoscopes over the life cycle of the devices, regardless of case volumes. The primary contributor to the per-case carbon cost of reusable devices is energy consumption of reprocessing, which may be offset with renewable energy sources.

Table. Carbon footprint per case for single-use and reusable flexible cystoscopes.

Single-use flexible cystoscope		Reusable flexible cystoscope	
Life cycle component	*Carbon footprint (kg CO_2)*	*Life cycle component*	*Carbon footprint (kg CO_2)*
Manufacturing cost (manufacturing footprint x cystoscope mass)	1.84	Manufacturing cost (cystoscope mass ÷ uses per life cycle)	0.0001
Mass of solid waste (cystoscope mass)	0.16	Reprocessing (energy consumption of automated endoscope reprocessor)	0.45
Manufacturing sterilization	0.3	Repackaging	0.005
		Repair cost (5 kg CO_2 per repair ÷ uses between repairs)	0.02
		Mass of solid waste (manufacturing footprint ÷ uses per life cycle)	0.003
Total	**2.30**	**Total**	**0.48**

Source of Funding: None

PD41-09

VARIABILITY IN COST-EFFECTIVE PRICE POINTS FOR SINGLE-USE CYSTOSCOPES BASED ON PRACTICE VOLUME: A REAL-WORLD ANALYSIS OF TWO PRACTICES IN A MAJOR URBAN CENTER

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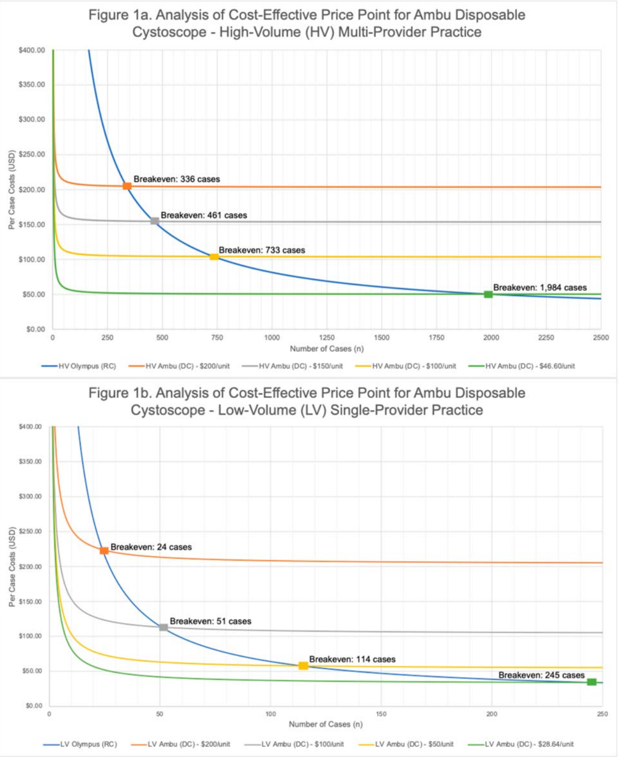
INTRODUCTION AND OBJECTIVE: The traditional cost of reusable cystoscopes (RC) is derived from up-front purchasing, repair fees and equipment reprocessing, whereas single-use, disposable cystoscopes (DC) trade off these indirect expenses for higher direct costs. Therefore, the point at which DCs become more cost-effective than RCs depends primarily on the price of the DC itself. We sought to define the optimal price point for cost-effectiveness of the Ambu® DC (aScope™ 4) versus the Olympus® digital RC (CYF-VHR and V2) for cystoscopies performed in two outpatient clinical settings: a high-volume (HV) multi-provider practice and low-volume (LV) single-provider practice.

METHODS: The number of cystoscopies performed at HV and LV between 1/2019-12/2019 was recorded. A micro-costing analysis was performed for DC and RC procedures, incorporating purchasing price, sterilization supplies, repair fees, and personnel costs. Using a variable pricing model, the optimal DC price was calculated − that is, the price of each individual DC, valve seal, and stopcock at which the per-case cost for cystoscopy performed with DC and RC was equal.

RESULTS: Cystoscopies performed at the HV [n = 1984] and LV[n = 245] utilized nine and two RCs, respectively. Taking into consideration relevant expenses for procedures at each clinic, the HV operated at a cost of $65.98/case and the LV operated at a cost of $232.62/case with reusable equipment. For a complete transition from reusable-to-disposable equipment to be economically feasible, the HV would need to purchase each DC at a maximum price of $46.60 to maintain cost-effectiveness. At the LV practice the maximum cost-effective price for DCs would be $28.64.

CONCLUSIONS: For both practices, an economically feasible DC price was <$50. This price was lower for the LV practice, suggesting that a practice run entirely with disposable equipment may be less financially feasible for low- versus high-volume clinics. Purchasing groups must be familiar with the economic implications of varying price points during negotiations to mitigate financial strain on the practice.



Source of Funding: N/A

PD41-10

EVALUATION OF DIFFERENT PNEUMOPERITONEAL PRESSURES WITH RESPECT TO TECHNICAL FEASIBILITY AND PHYSIOLOGICAL PARAMETERS IN LAPAROSCOPIC RENAL SURGERY−A PROSPECTIVE AND RANDOMIZED STUDY

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INTRODUCTION AND OBJECTIVE: There are no well validated studies to define safe and ergonomically efficient pneumoperitoneal pressures (PP) for transperitoneal laparoscopic renal surgeries (LRS). Though the impact of PP on intraoperative physiological parameters have been evaluated widely, it's effect on postoperative recovery is not well studied. This study aims to determine safe and optimal pneumoperitoneal pressures during transperitoneal LRS while evaluating its impact on intraoperative parameters and postoperative recovery.

METHODS: In a prospective, randomized setting (April 2019-March 2020), 78 adults undergoing LRS were randomized equally into 3 groups based on pneumoperitoneal pressures (Group I, 8-10 mmHg; Group II, 11-13 mmHg and Group III, 14-16 mmHg). Hemodynamic parameters and blood gas levels were measured: before CO2-insufflation (T0), 10 min after insufflation (T1), before desufflation (T2) and 10 min after desufflation (T3). Postoperative pain at 1, 6, and 12 hours and time to start oral feeds as well as